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GALILEO'S SYSTEM OF PATRONAGE

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I. THE BLIND SPOTS OF THE HISTORIOGRAPHY OF EARLY MODERN SCIENCE

Writing to Belisario Vinta in May 1610 inquiring about the possibilities of a position at the Medici court, Galileo apologized for taking up the time of such a high-ranking official for a matter that might seem of little relevance to him.[1] But, Galileo continued, such a decision was most important to himself, since it concerned the change "of the whole of my status and being".[2]

Galileo's statement indicates that patronage was not something that influenced only the external conditions of Galileo's work such as his economic status, his freedom from teaching duties, and his title. He claims that patronage determined his status and identity (*stato et essere*). It fashioned one's social identity, not just one's career.

Received historiography tends instead to offer a reductive view of patronage. The modalities of such a reduction reflect the quite different ways in which different well-established historiographical views try to preserve a sharp distinction between modern science and something different that took place before it, or between the 'scientific mind' and the flesh-and-blood scientist. Analysis of the methodological blind spots of received historiography indicates why early modern science usually has been characterized as lacking a well-structured social system, or why these scientists' patronage strategies have been examined merely to trace their careers rather than to study the formation of their socio-professional identity and of their conceptual styles and choices.

Concepts of 'professionalization', 'scientific community', and 'paradigm' have been very influential in Kuhnian and post-Kuhnian historiography of modern science. Although these historiographical categories have proven their heuristic relevance, they tend to produce a representation of early modern science as the 'other' of modern science, as what modern science is not. According to these views, early modern science up to about 1660 is characterized by the *lack* of real scientific institutions, organized professions, and forms of professional communication. Consequently, one cannot rely on the notion of paradigm to link theories to the social context in which they were produced. In 'those early times' exchange of information happened in informal ways. Reward for scientific production was a matter of dyadic, personal,

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unreliable patronage relationships. Without the stabilizing and directing effect of scientific institutions, paradigms sank in a sea of conceptual idiosyncracies.[3]

Although the distinction between paradigmatic and pre-paradigmatic — or between institutionalized and non-institutionalized science — is less disturbing than the distinction between modern rationality and prejudice or superstition as advertised by older historiographical views, it can — precisely because of its quasi-reasonableness — be quite insidious. For instance, modern historians tend to trace the notion of 'community' or 'institution' as far back as they can instead of problematizing notions of community, profession, institution, and paradigm once and for all. The recent conspicuous interest in Jesuit science is a good example of this institution-centred perspective in the historiography of early modern science.[4]

Institutions are very reassuring entities for historians because they usually come with conspicuous buildings (and pictures of them), statutes, archives, journals, and records of discussions and prize competitions, but we should not forget that the success of institutions as historiographical categories reflects not only their actual historical relevance but also their conspicuous archival 'presence'. The spell that institutions have cast on recent historiography has also a fetishistic character. Institutions allow historians to 'touch' the past in very tangible ways. In contrast, patronage — being an institution without walls, its reality made of etiquette-bound rituals rather than of 'things' such as buildings and statutes — has eluded many science historians.

Rather than granting that early modern science is a domain to which the categories of post-Kuhnian historiography do not apply, I claim that the problems encountered by that historiographical paradigm in dealing with early modern science expose its methodological blind spots. In fact, such a view cannot perceive early modern science as a structured activity and patronage as its social system because such a scenario would go against its fundamental assumption that scientific paradigms (and professional identities) are connected to scientific *communities*.

However, the history of early modern science is informed also by older methodological views. Representing a blend of the genres of history of philosophy and of biography, these narratives tend to introduce a problematic distinction between science (or the occult 'scientific mind') and flesh-and-blood scientists.[5] Usually, as in the case of Koyré, this kind of historiography does not concern itself with the social dimensions of science. When it does, as in the case of Westfall's analysis of Galileo's strategies for patronage, it produces a fiction of relatedness between conceptual and social dimensions of early modern science by developing narratives in which these two dimensions are finely broken down and textually presented in rapid succession. Micro-parallelism is presented as implying a relationship.

The blind spot of this historiography is indicated by a methodological inversion: the *explanandum* is turned into the *explanans*. The contextual emergence of a scientist's belief in a given theory is not explained but taken for granted as the 'natural' result of the 'force of that theory'. Then, the 'natural' belief in a theory is assumed to produce an equally 'natural' commitment to it. This so-construed 'professional conscience' introduces a convenient hierarchy in the interaction between the conceptual and social dimensions of science. The 'conscience' is the master. It responds to but is (or should) not be essentially modified by the environment. In this view, patronage is not just ignored, as it was with Kuhnian historiography, but becomes a necessary but potentially evil concern. Although scientists need it to support their research, patronage (like Bacon's idols) tends to obfuscate their professional conscience and corrupt their 'natural' commitment to their theories.

No doubt, the picture just presented is overly schematic, but an empirically accurate taxonomy of historiographical species is not necessary here. I want to indicate the categorical limits inherent in both Kuhnian and older historiographies (and in the various approaches developed out of the two in a bricolage fashion) in terms of how much integration they can allow between social and conceptual dimensions of early modern science. Instead, a finely articulated notion of patronage may provide a structure through which these methodological blind spots can be removed, allowing for the integration of the social and conceptual dimensions of early modern science.[6]

The first step of this project involves the rejection of the notion of patronage as a mere set of rational strategies and relations through which a scientist makes a career (acquires money, power, and free time to do research). By perceiving patronage only in terms of its economic dimensions, we may end up believing clients to be rational individuals fully committed to some sort of research program in favour of which they try to manipulate the patronage system. But 'ends' and 'means' are not clear and distinct categories to which we can have access. By linking patronage to the *social process of self-fashioning* of the clients, rather than simply to their economic subsistence, we can relate cultural production to the social context. Rather than looking for paradigms, we should focus on the study of the client's identity in all its socio-cultural dimensions, as well as on a scrutiny of the processes through which such an identity is shaped.

In fact, the process of identity-formation does *not* need to take place in well-circumscribed professional groups such as scientific communities or institutions. All those sociological and conceptual dimensions of modern science that the Kuhnian historiography attributes to the professional identity one develops by being socialized into a scientific community, must be searched for in the process of self-fashioning that early modern scientists underwent by engaging in patronage relationships. However, I am not claiming that patro-

nage is the early modern analogue of scientific community. I am suggesting that patronage is the key to understanding processes of identity and status formation which — in turn — are the keys to understanding *both* the scientists' cognitive attitudes *and* career strategies.

II. PATRONAGE, STATUS, AND CREDIBILITY

The institution of patronage one finds represented in Galileo's texts and correspondence is not structurally different from that which can be reconstructed from autobiographies of artists such as Benvenuto Cellini or from the correspondence of Renaissance and baroque courtly poets like Ludovico Ariosto or Giambattista Marino.[7] Patronage was a widespread social institution of early modern Europe and one which is still very powerful in today's Mediterranean basin. Cicero thought that the origins of Roman *clientela* were so ancient that it must have been brought to Rome by Romulus himself.[8]

Recent historiography of early modern Europe indicates that patronage was a fundamental form of social binding and hierarchical organization. Also, patronage bondings could be so finely ingrained in one's identity that it is sometimes impossible to sort family from patronage ties, or friendship from clientelism.[9] In the specific case of Renaissance Florence, patronage has become a standard historiographical category by which ritual interaction in civic life, sense of heritage, kinship and friendship bonds, political and economical activity are analysed. Similarly, the study of patronage dynamics is central to the analysis of the culture, politics, and structure of early modern courts. By now, patronage studies have successfully broadened their scope well beyond the consideration of who paid the bill into the study of processes through which social differentiations and hierarchies were developed and maintained.[10]

Nonetheless, historians of early modern science continue to perceive patronage simply as "a set of dyadic relations between patrons and clients, each of them unique", as something that "had no institutions and little if any formal structure" and that the "relation between patron and client was voluntary on both sides".[11] But the client — Galileo in this case — was not alone in developing a so-called personal patronage relationship with the prince. Everybody around him was doing the same. The entire court structure was kept together by patronage. Patronage was not a *set* but a *system* of dyadic relations.

To perceive patronage relationships as voluntary is to accept the very self-legitimizing social representation of patronage. Early modern patronage resembled feudal forms of social bonding. Patronage ties were represented as honour-bound rather than dictated by economic rationality. Consequently, they were represented as voluntary. The client 'loved' to serve and the patron

'loved' to be served. Behaviour in Renaissance courts was structured around these principles. For instance, in the first part of the sixteenth century, most aristocrats who served their princes at court did not receive salaries. The prince would show his appreciation for their services by giving them gifts and privileges, but not cash. Even clients of lower status were interested in presenting their ties with their patron as voluntary so as to hide the economic dimension of their services and consequently present themselves as disinterested, that is, as noble, as possible.

The representation of patronage relationships as voluntary was a strategy to legitimize the received social structures and hierarchies. Unless one engaged in a complex network of patronage relationships, a career and social mobility were impossible. Patronage was a voluntary act only in the sense that by not engaging in it one would commit social suicide.

The legitimation of early modern mathematical physics involved much more than an epistemological debate. The low social status of the discipline (especially in relation to philosophy) was probably the major problem that had to be overcome in order to achieve the epistemological legitimation of mathematical physics. Social status was the password to cognitive legitimation, patronage was the institution through which social status could be gained, and the court was the space in which powerful patronage relationships could be established.[12]

The link between social status and cognitive legitimacy was by no means an Italian phenomenon, nor was it limited to the realm of science. Peter Dear has argued convincingly that the early Royal Society of London's parameters for the evaluation of evidence were sensitive to the social status of the observer. Nobility and credibility were perceived as related; by having many churchmen and aristocrats among its members, the Society gained "social prestige, which could itself be turned to evidential advantage".[13] Steven Shapin and Simon Schaffer have traced a similar relationship between the reporter's or witness's social class and the level of trust credited to their reports.[14] Moreover, as shown by Peter Burke, social status not only regulated trust, but also influenced the very possibility of communication. For instance, the parish priests in charge of data collection for the seventeenth century Venetian censuses went around mapping the parish's households together with a nobleman in case noble residents refused to answers questions asked them by a simple clergyman.[15]

To understand how Galileo and other mathematicians interacted, communicated, disputed, presented their arguments, and tried to gain the legitimation of their theories, we must consider status and honour and how these were developed and sometimes lost through patronage. I propose to study these processes by analysing Galileo's correspondence up to about 1613 — the period of his life in which he experienced the strongest social acceleration —

trying to reconstruct the etiquette of patronage out of the apparatus of 'baroque rituals' that fills those letters.

III. THE MICROPHYSICS OF PATRONAGE

Power is not a thing but a process, and a patron is somebody who can *do* things for the client.[16] A patron has power in the measure in which he/she can make it circulate and be productive. Therefore, a patron was often a broker, a *trait d'union* between the client and a higher source of power such as a greater patron. A client's access to a patron was not just a technical matter of getting to know the right ways to contact him/her. Access to patronage was not a matter of information one could get from the yellow pages. Hierarchies of patrons and clients reflected hierarchies of status: they mirrored social structures. Therefore, not all clients were eligible for all types of patronage. A too lowly client could not approach a very important patron directly.

During the early phases of his career, Galileo's status was not sufficient to allow him to address the Grand Duke directly. And when he finally did so in 1605, he was aware he was crossing some status boundary and therefore tried to diffuse a potential breach of etiquette:

> I have waited until now to write to Your Most Serene Highness because I was held back by a respectful concern of not wanting to present myself as temerary or arrogant. In fact, I made sure to send you the necessary signs of reverence throught my closest friends and patrons, because I did not think it appropriate — leaving the darkness of the night — to appear in front of you at once and stare in the eyes of the most serene light of the rising sun without having reassured and fortified myself with their secondary and reflected rays.[17]

As indicated by Galileo, brokers were more than simple distributors of power and privileges. They also preserved social structures and boundaries that otherwise might have been violated by improper contacts during actual or attempted patronage relationships.[18]

The role of brokers was also tied to specific rituals of power, detectable in Galileo's correspondence. A great patron like the Grand Duke avoided formalized patronage connections outside his court. By reinforcing the instability of patronage links outside the court and by forcing the client to 'reapply' regularly for patronage, the prince stressed his own power. For instance, Galileo did not have a permanent job as mathematical tutor of young Cosimo. He was not required to come down to Florence each summer to instruct the prince. Instead, Galileo had anxiously to check his standing with the Medici every year to be sure of their continuing interest in his services.[19] And he had to do that through brokers.

Conversely, an important patron could not ask things or services directly from his low-status clients because a refusal on their part would have stained his/her image. Here again, brokers played an important role by communicating the patrons' desires while protecting their image. Several important cardinals did not ask Galileo directly for telescopes, but had common acquaintances advise Galileo to send them good ones.[20] Similarly, when Grand Duke Ferdinando supported Galileo's request for a higher salary in Padua in 1605, he did not press the Venetian authorities personally, but through his *residente* in Venice, Asdrubale da Montauto.[21] As Galileo was told, the Grand Duke thought that the republican Venetians disliked to be pressured by princes. Through this nice fiction, Ferdinando communicated that he did not want to put himself 'on the line' for an issue so marginal as Galileo's stipend.

Galileo's earliest career goal was to gain a university post, which he eventually obtained at Pisa in 1589 and at Padua in 1591. The second phase in his pursuit of patronage, which began around 1600 and grew more systematic after 1604, focused on obtaining a position at either the Medici or Gonzaga court.[22] Although both phases were largely dependent on the Medici power, they were structured around two different sets of brokers and patrons. The first phase of Galileo's career was largely shaped by the patronage/brokerage relationship with Guidobaldo del Monte. In contrast, his election to a court position in 1610 can be seen as the fortunate result of a range of long-term patronage strategies centred on young Cosimo de' Medici. These strategies made it possible for Galileo and Cosimo to grow together — Galileo as a client and Cosimo as a patron — and were carried through a range of brokers less powerful than Guidobaldo but strategically located for the task.

The development of the necessary brokerage connections with Gerolamo Mercuriale, the Saracinelli (uncle and nephew), the Giugni (father and son), Cosimo Concini, Giovanni Battista Strozzi, Baccio Valori, Antonio de' Medici, and Silvio and Enea Piccolomini was no small feat. A number of these connections were family assets — they had been passed on to Galileo by his father Vincenzio, and they would be passed on to Galileo's son.[23]

Galileo's strategies to gain the support of young Cosimo were not original. Becoming a young prince's tutor was one of the standard avenues through which intellectuals could enter into a patronage relationship with powerful patrons. It was a strategy based on the hope that the young pupil would strengthen his/her ties with the tutor while reaching maturity and power. Galileo was introduced to this strategy in the spring of 1601, when Cosimo was eleven years old. It was Mercuriale — a professor of medicine at Pisa and the Grand Duke's *Protomedico* — who gave Galileo the hint. Mercuriale was a perfect broker for Galileo. A courtier very close (physically at least) to the royal family, he also understood Galileo's intellectual assets well and saw how they could be turned into something appealing to court patronage.

Mercuriale wrote Galileo in Padua that the following year (1602) the prince would be old enough to begin to study mathematics "and I believe you will have a chance to demonstrate your talent and — who knows — *that may bring you some good luck*".[24] In the same letter, he also advised Galileo to perfect the military compass and bring it to Florence, indicating that he would act as a *trait d'union* between Galileo and the Medici in case he wanted to show or offer the compass to them. Mercuriale's scheme did not materialize as quickly as he expected, but his lead was a good one, for it was through the dedication of the military compass that Galileo strengthened his patronage relationship with young Cosimo and with the prince's mother, the powerful Grand Duchess Cristina.

Galileo did not dedicate his compass to Cosimo through the intercession of Mercuriale, who died in 1606, but reached the Medici through other court brokers. It was through Giugni, the Saracinelli, and the Piccolomini that Galileo proposed the dedication of the compass, inquired about his standing with the Medici and about the possibility of a position at court, asked for Medici support for a salary raise at Padua, inquired about the development of the suit brought against him by his brother-in-law, and checked the Grand Duke's will to have Galileo continue to teach mathematics to young Cosimo during the summer.[25]

As far as we know, it was only at the end of 1605 that Galileo bypassed his brokers and wrote directly to young Cosimo for the first time. On this occasion Galileo did not communicate or ask anything specific, but presented Cosimo with an all-encompassing declaration of his desire to serve his prince in whatever fashion he pleased.[26] The letter functioned as a rite of passage. With it, Galileo claimed that he had gained sufficient intimacy with the prince to address him directly and showed that Cosimo had grown old enough to be dealt with no longer as a tutor-dependent boy but as an independent individual.

Although Galileo's early brokers kept playing an important role in his career, their function became increasingly that of informers after Galileo was able to link up with a Medici *Secretario* — Belisario Vinta.[27] In fact, it was during the negotiations with Vinta concerning the purchase of Sagredo's lodestone for Cosimo that Galileo introduced the specific patronage strategies that would later secure for him a position at court.[28] Through Vinta, Galileo was able to consolidate his hold on Cosimo. Now, it was a matter of waiting for the ugly princeling to metamorphosize into a powerful Grand Duke.

Behind the apparent fragmentarity of Galileo's early strategies to gain Medici patronage we can detect a system. Galileo consciously invested in a patron destined to become powerful and carefully improved his connection with him by relying on a series of increasingly powerful brokers all closely tied to him. The most powerful of them was Cosimo's mother, the Grand Duchess

Cristina. Similarly, Galileo's other court brokers — Mercuriale, Saracinelli, and Piccolomini — were also connected to young Cosimo, being all involved in the planning and supervision of his education.[29]

Having been connected only marginally to the court networks of power during his youth, and possessing un-courtly skills such as mathematics, Galileo became a top court client only after his astronomical discoveries of 1610. His later friend Ciampoli was probably better connected at twenty than Galileo at thirty-five. Before 1610, there was a major gap between Galileo's perception of his worth and his value on the courtly market. That gap could have been bridged only by growing on (and training the tastes of) a future Grand Duke. A well established courtier would have aimed for the patronage of Cosimo's father without bothering with the young prince, whose patronage he would have obtained naturally in due course.

Galileo's options were much narrower, but he played them right. His career following the discovery of the Medicean Stars was not the fruit of chance but rather of an earlier systematic weaving of patronage relationships according to typical patterns and strategies. Without those carefully forged relationships, the Medicean Stars would not have projected him into stardom.

But clients' ascension toward great patrons was not a single-handed feat. Brokers were there like talent-scouts looking for potentially upwardly mobile clients in which to invest their connections. While clients like Galileo were betting on young patrons like Cosimo, brokers were betting on clients like Galileo. Belisario Vinta was quick to notice Galileo's increased standing at court and tried quite explicitly to become Galileo's sole broker. When Galileo left the Medici court in the fall of 1608 to go back to Padua, Vinta told him: "Contact me and nobody else for your needs."[30]

Brokers *pushed* the clients they considered worthy. For instance, in 1601 Mercuriale did not simply inform Galileo about his status at court, but he actively pushed him to complete the compass and offer it to the Medici. The pushiness of Galileo's early Florentine brokers does not seem much different from the pressure exercised by the Lincei on Galileo for the writing and publication of the *Assayer*. Patronage did not simply reward clients *a posteriori*, but also stimulated and accelerated them towards not always happy endings. Patrons and brokers were somewhat like bankers who want and need to loan money in order to make more money.

The frequent statements of *amicizia* found in letters to Galileo in which patronage is formally offered to him through statements like "I beg you to order me", or Galileo's ritual confirmation of his willingness to 'serve' his patrons back, must not be viewed as empty formalities characteristic of the baroque era. They were, instead, ritualized forms of advertisement.[31] The interdependence of the welfare of clients and patrons emerges most explicitly in Galileo's letters of congratulation to patrons on occasions of their promo-

tion. These letters were, at the same time, celebrations of the patron's increased power and reminders of Galileo's requests for patronage. The letters Galileo sent to great patrons — like that to Guidobaldo on the occasion of his brother Francesco Maria's elevation to the cardinalate, or that to Cosimo on the occasion of his father's death and his accession[32] — were appreciated but did not trigger any explicit patronage commitment from the patron's side. Smaller patrons tended to be more explicit about their desire to put newly acquired power to work through patronage relations.

Francesco Morosini, a friend of Sagredo's whom Galileo congratulated for his election to the *Saviato di Terra Ferma* — a Venetian magistrature in charge of the University of Padua among other things — expressed the desire to patronize Galileo "in every major occasion"[33] — where 'major' referred to Morosini's increased power as well as to the rank of privileges he could now secure for Galileo. Sebastiano Venier, who was elected to the *Saviato* with Morosini, answered another of Galileo's flattering letters of congratulation by saying that the promotion was much welcome for it allowed Venier to "support the desires of my friends".[34] Analogous messages were returned to Galileo by Alessandro d'Este whom Galileo congratulated on reaching the cardinalate[35] or — several years later — by Cardinal Lorenzo Magalotti, who reminded him that "I look forward to the occasion of serving you".[36]

These statements were not empty formalities. Brokers and patrons needed clients. If nothing else, clients were necessary to keep the patron's connections active and to test his or her power. For instance, Guidobaldo did not expect anything back from Galileo for having secured him two university chairs, but he mentioned more than once his desire to see his will (to find Galileo a job) respected. Guidobaldo was testing his own power in Florence, Padua, and Venice by patronizing Galileo. His success in seeing his desires taken seriously was not just rewarding to Guidobaldo's ego but was also an empirical indicator of his power.

The use of a client as a probe was not a practice restricted to great patrons. Galileo himself made use of such a strategy as early as 1606 when he proposed Fabrizio d'Acquapendente to replace the recently defunct Mercuriale as the Grand Duke's *Protomedico*. In writing to Cristina about Acquapendente, Galileo checked his standing with the Grand Duchess and tested the Medici's willingness to patronize a court role quite similar to the one he would request for himself later on. By the time he wrote the letter about Acquapendente, Galileo had already expressed his desire to obtain a position at court, but without success.[37]

He says that Acquapendente,

> having achieved here all that he could in terms of wealth and reputation, and finding it uneasy to endure the continuous duties he has accepted to

> satisfy his many friends and patrons, because of his age, is very much looking forward to some leisure for both the preservation of his health and for the completion of some of his works. And all that he needs to satisfy his ambition is to reach those titles and positions reached by others in his profession, and those can be given him only by some great absolute Prince. Consequently, I believe he would be very pleased to serve Your Most Serene Highness.

The striking analogies between Galileo's presentation of Acquapendente's state and desires to Cristina and of his own in his letter to "S.Vesp"[39] in 1609 and to Vinta[40] in 1610 suggest that while acting as Acquapendente's broker, Galileo was testing both his standing with his own patron and the potential success of the strategies he had developed about his own career.

The etiquette of letter-writing offered patrons and clients ways of testing each other's interest in a patronage relationship. The *cirimonie* mentioned in Galileo's correspondence served this purpose. When a client like Galileo wanted to test a patron or broker's availability, he would write extravagantly flattering letters and then study the response. If the answer was a friendly rebuff of Galileo's *cirimonie*, it meant that he had been accepted as an 'intimate' client — a client with whom all those ceremonies would be out of place. But Galileo — as all clients — was bound to carry out those ceremonies until he was advised to the contrary. The refusal of ceremonies was itself a ritual; it meant that Galileo was granted enough status to enter into a patronage relationship. The delivery and denial of ceremonies was an epistolary rite of passage.

These patronage rituals were expressions neither of Galileo's idiosyncracies nor of late sixteenth century Florentine court culture. They can be found in patronage-related letters dating from the late Middle Ages. Richard Trexler has noticed the same epistolary rituals while analysing the development of the complex kinship between the rich medieval merchant Francesco Datini and the Florentine notary Lapo Mazzei.[41] The requests to drop the rhetoric of *cortesia* found in the Mazzei–Datini correspondence matches what we encounter in Galileo's correspondence.

In his first reply to Galileo, Guidobaldo rhetorically presented himself as uncomfortable with Galileo's flattering letter which expressed a desire to enter in *amicizia* with and to serve Guidobaldo:

> You do not realize that you are praising me way too much, and beyond any of my actual merits. But in this I recognize your attempt to communicate your feelings, certainly too courteous toward me.[42]

Although Guidobaldo accepted Galileo *as a client*, he made sure to present

their relationship as *amicizia*, as a voluntary bond among mutually serving kinsmen: "... you can be sure to have somebody who will not waste any occasion to serve you whenever you will require it."[43] Probably Guidobaldo had to lift Galileo's status — at least rhetorically — so that he could interact with an aristocrat like himself.

Galileo did not use ceremonies only in establishing new patronage connections but also to test older ones that had been left inactive for sometime. He used them with his close friend Sagredo after the two had been out of touch for a long time. He received the rebuff:

> I am not going to reply to the ceremonies Your Most Excellent Lordship wrote me ... both for lack of time and also to suggest that in the future you should not indulge in these superfluities.[44]

He employed the same *superfluita* for the same reasons with Mercuriale, his former colleague at Pisa, who wrote back that

> I did not know that mathematicians — who deal with certainty only — would then apply themselves to mislead men with eloquence, but I had to change my mind after I received your letter ....[45]

Similarly, Galileo flooded the Saracinelli — two of his important brokers at the Medici court — with ceremonies in order to test their continuing availability as patrons.[46] The link between the absence or ritualistic rejection of ceremonies and the establishment of a patronage relationship is made explicit by Sertini, a Florentine friend and a later client of Galileo, who wrote him in Padua that "*If we did not know each other*, I would go out of my way to make plenty of excuses and ceremonies to Your Lordship ...".[47]

These considerations indicate that patronage was not a chaotic set of personal and voluntary relationships, but that it had its specific structure and a logic that bound patrons, brokers, and clients through their need to circulate power in order to maintain or obtain it. Appropriate boundaries — and related rites of passage — controlled that circulation, while specific rituals allowed patrons, clients, and brokers to test in non-disruptive ways the perceptions of each other's status and interests in entering into a patronage relationship.

But if patronage was the social institution through which social mobility was made accessible at all, not every patronage relationship offered the same possibilities of social ascent and legitimation. A major leap in social status could not be achieved by compounding the legitimation offered by the patronage received from many small patrons. It could be achieved only through the patronage of a great single patron. This is why the court was such a powerful institution in legitimizing socio-professional identities: it was the

space of the prince, of the great patron(age). Galileo understood well how different ranks of patrons could provide different levels of social legitimation.[48]

As he told Vinta, a republic like Venice, being a sort of patrician corporation, could not offer the type of legitimation he was looking for. Galileo's frequently expressed desire to serve one great patron only, rather than many smaller ones, has usually been read as an attempt to obtain plenty of free time for research.[49] However, it had also to do with the status attached to serving a single high patron. Writing early in 1609 to a Florentine courtier, Galileo expressed — in a form very similar to that in which he would negotiate with Vinta in the wake of his discoveries — his desire to obtain a court position. He claimed that his interest in such a position was not related to the *amount*, but to the *type* of work he would have to face at court:

> Regarding the everyday duties, I shun only that type of prostitution consisting of having to expose my labour to the arbitrary prices set by every customer. Instead, I will never look down on serving a prince or a great lord or those who may depend on him, but, to the contrary, I will always desire such a position.[50]

Galileo understood that a patronage relationship with a great patron or his brokers brought 'purity' (i.e., high status) because it was 'monogamous', exclusive, and paid through a regular stipend. Instead, to serve many low patrons and be paid piecemeal was a sort of prostitution ("servitù meretricia"). By developing an exclusive and full-time interaction with a great patron one participated in his/her 'nobility', a high status that could then be transferred from one's social identity to one's discipline or activity. And high social status was instrumental in gaining recognition of the epistemological status of a discipline and method like Galileo's, the legitimacy of which was denied by the existing hierarchy among the liberal arts.[51]

In going up in the social ladder by engaging with an increasingly *smaller* number of patrons of *higher* power, a successful client like Galileo built a pyramid of clients below him. Galileo's correspondence from people asking for his patronage took a sudden jump around 1610.[52] It would be wrong to assign that jump to Galileo's popularity as a discoverer. Discoverers do not get power from their discoveries, but from the institutions that legitimize them. Galileo's power as a distinguished courtier in Florence was much higher than that he had or could have had as a university professor of the Venetian republic. While in Padua, Galileo received a few requests for patronage, but seems not to have fulfilled any of them. Instead, after 1610 he was able to place a range of mathematicians and philosophers (like Castelli, Cavalieri, Aggiunti, and Papazzoni) at the universities of Pisa, Rome, and Bologna. A more complex reading of patronage dynamics shows that Galileo was seeking much more than free time at the Medici court.

IV. PATRONAGE CRISES AND PROVIDENTIAL DEATHS

Recurrent features of clients' lives in early modern Europe were the discontinuities and disruptions produced by the termination of patronage relationships — most frequently as a result of the patron's death. The trajectories of early modern clients were not smooth curves, but tortuous and discontinuous paths representing crises in patronage relationships. The careers of Commandino, Leibniz, Dee, Kepler, Tycho, and Galileo exemplify these dynamics.

Biographies of Galileo present the turning points of his career as related to discoveries and controversies (the Medicean Stars, the *Letter to the Grand Duchess*, the dispute on comets and the *Assayer*, the trial of 1633, and the last dispute with the philosopher Liceti). Another pattern emerges when we compare the chronology of the turning points of Galileo's career and those of his patronage relations.

The first phase of Galileo's career was deeply indebted to Guidobaldo del Monte, through whom Galileo gained the university positions at Pisa in 1589 and at Padua in 1592. In fact, this phase of Galileo's career was an indirect result of the accession of Ferdinando I de' Medici in 1587 following the death of his older brother, the Grand Duke Francesco I. At the time of Francesco's death, Ferdinando was a cardinal and he maintained that title until the end of 1588 because there was no other member of the Medici family who could take over that post. In December 1588 Ferdinando put a client of his — Francesco Maria del Monte — in his place as 'Medici cardinal'.[53] By this time, Galileo had been a client of Guidobaldo for almost a year but all Guidobaldo's attempts to find a post for Galileo through his brother Francesco Maria, then only a *monsignore*, were not yet successful.[54] But things changed quickly after Francesco Maria turned cardinal at the end of 1588. The very next autumn Galileo was teaching in Pisa. Galileo showed that he understood the possibilities entailed by this change in the power of the Del Monte when in December 1588 he wrote to Guidobaldo congratulating him on his brother's promotion.

It was through Guidobaldo and other members of the Del Monte family that Galileo was introduced to Padua's most important patron, Vincenzio Pinelli. Pinelli died in 1601, but by that time he had introduced Galileo to the patronage of Venetian patricians. Sagredo became Galileo's most important patron in the 1600s. Guidobaldo died in 1607, but — as we can see by the infrequent letters exchanged by the two after 1600 — by then Galileo did not need his protection and support any more.[55] Similarly, when Sagredo was sent to Syria in 1608 as the Venetian ambassador, his departure did not damage Galileo's position in Venice because by then he had already established relationships with a number of powerful Venetians and Paduans, such as Duodo, Morosini, Priuli, Gualdo, and Venier. As a disappointed Sagredo would write to Galileo after his move to Florence, the position he had left

behind in Venice was a safe one. His formerly young patrician patrons were growing older and more powerful. He could have risen with them.[56] Since patronage networks in republican Venice were not focused on one great patron, a client like Galileo was not so heavily subjected to disruptions caused by the patrons' deaths, departures or changing tastes, as he would be in a princedom. But while making the clients' lives safer, the absence of a great patron reduced the clients' opportunities for great jumps in social status.

The second phase of Galileo's career was characterized by the emergence of a new patron and the rejection of old ones. Galileo's revolutionary discoveries went hand in hand with a revolution in his patronage relationships. He gained the patronage of Cosimo II and caused legitimate surprise and bitterness by breaking the contract of *amicizia* with his Venetian patrons right after they had confirmed and strengthened it. And, as in the case of the patronage crisis of 1589, a major improvement in Galileo's status came about also as a result of an accidental shift in patronage possibilities.

In 1589 it was Francesco's death that turned Francesco Maria del Monte (via Ferdinando and Guidobaldo) into a powerful patron of Galileo. In 1609, Ferdinando's death turned Galileo's young princely student into a Grand Duke just a few months before Galileo's astronomical discoveries. Neither Francesco nor Ferdinando had been direct patrons of Galileo. Cristina and Vinta were the main brokers through which Galileo maintained Medici patronage. However, the deaths of the two Medici Grand Dukes proved crucially beneficial for his career. Quite correctly, Galileo used to present himself to the Medici as their 'natural' client.

Cosimo's enthronement in 1609 was particularly advantageous for Galileo's career, for new ideas are better supported by young patrons who need to develop an image for themselves. But it is not the case that Galileo happened to find the right patron at the right time. Although chance played a great role in bringing about such a *mirabil congiuntura* between Galileo's discovery and the positive crisis in his patronage networks, we should not forget that such a 'coincidence' was the product of a long-term patronage strategy that he had been pursuing since the early 1600s.

Another major phase of Galileo's career, characterized by his increasing orientation toward the Roman court, was similarly structured by a new patronage relationship, that with prince Cesi and his Accademia dei Lincei. The Roman phase gained impetus in the late 1610s with the coming-of-age of two young but increasingly powerful Lincean patrons: Cesarini and Ciampoli. The Lincei's role first in pushing Galileo to write the *Assayer* and then in publishing it indicates that the Roman phase of Galileo's career was tied in with Lincean (or Lincei-based) patronage. Much more than comets was behind the *Assayer*.[57] In parallel with the increasing importance of the Lincei's patronage in this phase of Galileo's career, Medici patronage declined.

In 1621 both Antonio de' Medici, an old and powerful patron of Galileo's, and the Grand Duke Cosimo II died. Cosimo left an adolescent son who would not be able to reign until 1628.[58] Moreover, Galileo's powerful Florentine patron and friend Salviati had died abroad in 1614 after having fallen out of grace with the Medici.[59] Belisario Vinta had also died in 1613.

The turning point of Galileo's Roman phase was also centred on a patronage-related event: the death of Pope Gregory XV and the election of Maffeo Barberini as Urban VIII in perfect timing with the publication (then dedicated to him) of the *Assayer*[60] and with the coming of age of Cesarini and Ciampoli as important patrons within the Roman court. Gregory's was the third providential death in Galileo's career. As with Cosimo II thirteen years before, we find a patronage scenario in which a new patron (one whom, like young Cosimo, Galileo had been cultivating for a number of years) suddenly reached a very important status and was willing to support Galileo's provocative views in order to develop a necessarily new image of himself. In terms of patronage, the *Sidereus nuncius* was to Cosimo II's reign what the *Assayer* was to Urban VIII's. Galileo was quite right in calling this remarkable synchronization a *mirabil congiuntura*.[61]

There is no perverse pleasure on my part in stressing the 'providentiality' of these deaths for Galileo. Deaths of great patrons — especially of monarchs like popes who were not members of an hereditary dynasty — were perceived by contemporaries as major patronage crises. Careers were suddenly made or destroyed on those occasions. Entire new cadres could come to power with a new pope, and Urban's former clients like Cesarini and Ciampoli found themselves projected to remarkable heights.[62] Non-Roman clients would also try to take advantage of the new scenario by going to Rome in a sort of patronage pilgrimage (an actual procession toward the centre of power) to pay homage to the new pope. Galileo himself participated in the pilgrimage of 1623–24 (one that the poet Soldani, alluding to the comets that had appeared a few years before, compared to the trip undertaken by the three magi to pay homage to the baby Jesus[63]). The gift with which Galileo presented the new pope was the *Assayer*.

The end of Galileo's Roman successes marked by the trial of 1633 can be seen as related also to patronage dynamics. In fact, patronage 'quakes that cleared the grounds for the construction of brilliant careers at the Roman court could also shatter them, as had been the case with the mathematician Commandino.[64] *The courtier's philosophy* — a court game not unlike today's "Monopoly" — published by Alonso de Barros in Madrid in 1587 prescribed that those who landed on square 43 ("your patron dies") had to go back to the start.[65] Similarly, Galileo's condemnation cannot be separated from the end of the patronage relationship between Urban VIII and Galileo's most important

supporter in Rome, Giovanbattista Ciampoli.[66] Moreover, Galileo's troubles of 1633 were preceded by the deaths of two of his major patrons, the Cardinal del Monte (1626) and Prince Cesi (1630). With Cesi's death — and the much earlier one of Cesarini in 1624 — the Lincei lost their power to support Galileo in the Roman curia. Ciampoli was his last great patron — his "Mecenas".[67] Therefore, although Galileo's condemnation was the product of contingent dynamics, it was, at the same time, an instance of a more general pattern. It epitomizes a frequent kind of patronage-related termination of a client's career.

The last dispute that punctuated Galileo's career, that with the philosopher Liceti, marks Galileo's last attempt to regain Medici support through his young admirer prince Leopold, the future founder of the Accademia del Cimento. This attempt, very reminiscent of Galileo's more successful strategy with Cosimo, was mediated by Jacopo Soldani, a friend and broker of Galileo. Soldani's role at the Medici court was not unlike that of the brokers through whom Galileo had gained Cosimo's patronage. In fact, Soldani was Leopold's *Aio*, his primary advisor and tutor — a position identical to Piccolomini's and comparable to that of Saracinelli, Mercuriale, and, in a sense, of Cristina.[68] Galileo did not live long enough to test the potential of this new patronage connection.

The synchronization of Galileo's publications and the crises of his patronage relationships indicates more than a series of remarkable coincidences. Certainly, patronage was not a fully predictable process, but it was far from being chaotic. As we have seen, it had its logic, roles, rituals, and periodical crises tuned to generational cycles — crises that could be expected and intelligently bet upon. Successful careers were those of clients who could tune their production to those cycles and set up the conditions for *mirabil congiunture*.

And patronage did not only determine Galileo's worldly successes or downfalls, but played an important role also in the determination of what questions he addressed himself to as well as the discoursive strategies he adopted in the process. For instance, the *Letter to the Grand Duchess* can be seen also as Galileo's response to an attempt to disrupt his patronage relationship with the Medici by insinuating doubts over his religious orthodoxy in the very pious ears of the very powerful Cristina. Similarly, the *Assayer* is a remarkably patronage-laden text: one triggered by a question from a patron he could not ignore (Maddalena's brother Leopold of Austria) and then strategically situated within the Roman patronage scenario. Moreover, Galileo did not simply dedicate the *Sidereus nuncius* to Cosimo II. He actually wrote it as an omen of Cosimo II's reign, perfectly fitting the discourse of the Medici dynastic myths.[69]

V. GIFT-EXCHANGE AS THE LOGIC OF PATRONAGE

Galileo's correspondence shows that gifts and other economically non-quantifiable services were the medium through which patronage relationships were articulated and maintained. Even when much cash became involved, as with Galileo's remarkable stipend at the Medici court, we should not view it through our capitalistic *logos* and reduce the significance of those thousand scudi only to their buying power. Their symbolic dimension was equally important. In this period, income was more a sign than a cause of status.

Galileo did not negotiate his stipend. All his efforts were aimed at securing Medici patronage in some stable fashion, and when his wishes eventually materialized, he simply told Vinta how much he made at Padua and left the figures to the generosity of the Grand Duke. Galileo's stipend was a result of both Galileo's value and the Grand Duke's *noblesse oblige*. It was an emolument, a sign of Cosimo's generosity and power in reciprocating in due proportion Galileo's generous gift of the dedication of his astronomical discoveries to the house of Medici. Galileo's salary was not a number in the Medici payroll, but an item of public information. A Florentine chronicle of the time says that to reward his dedication of the Medicean Stars the Grand Duke called Galileo back to Florence and gave him a good stipend.[70] Galileo's stipend was a *public gesture*, an act of patronage, a life-long gift. If the Medici were to be stingy with Galileo, they would have automatically belittled the significance of the Medicean Stars in the public eye. Galileo's stipend was not the product of dynamics of offer and demand operating in a free market (Medicean Stars could not be bought in the market place), but rather of the economy of honour characteristic of the exchange of status-carrying gifts.

Even when patronage relationships are represented through monetary exchanges, their underlying logic is that of the gift. As with the potlach of the Indians of the American North-west analysed by Marcel Mauss, gift-exchange was an exercise of power.[71] In early modern Europe, patronage was a competitive process of social selection effected through the important patrons' challenge of each other's power to spend. For instance, Louis XIV managed to control the rebellious French aristocracy in part by impoverishing it through a challenge of conspicuous expenditure.[72]

Although gift-giving did not have to be an openly competitive process, the competitive subtext was always present. The relation between a client and a patron was characterized by the patron's power to give the client more than the client could return. The disparity in gift-giving power was stressed as a way of confirming a situation of dependency. By accepting the gift from the patron without 'challenging' back, the client admitted his/her 'defeat' and dependency.

I am not saying that clients never gave gifts to their patrons. A client who

could not offer interesting gifts would not go far. As Galileo's brokers often reminded him, he should bring 'new things' every time he visited Florence. Gift-giving was the best investment for a client because the patron was bound by his status to replicate gifts in proportion to his own (rather than the client's) status. A high patron always perceived gifts as challenges. If he accepted them, he was bound to behave as if he had accepted a duel, that is, 'heroically'. For instance, in 1604 Galileo received from the Gonzaga a gold medal and chain and two silver dishes worth 1340 lire — this for a military compass and the training in its use for which Galileo usually charged his Paduan students about 200 lire.[73] This multiplication of the value of the client's gift also appears in the very generous stipend Galileo obtained at the Medici court in exchange for the dedication of the Medicean Stars.

Instances of patrons who refused material gifts from the client without putting an end to the patronage relationship do not refute my claim of gift-giving as the medium of patronage. For instance, after having helped Galileo obtain the chair at Padua, Guidobaldo told him that "I do not want you to feel obliged to me because of the chair at Padua, because I did not have anything to do with it".[74] Guidobaldo lifted the patronage relationship with Galileo above the material level so that he could accept 'intellectual gifts' (the only ones Galileo could offer at that stage of his career) as a legitimate return for his patronage. And, by presenting himeslf as appreciating the 'immateriality' of Galileo's gifts, he reinforced his own identity as an aristocrat — one who did not need to be paid for the privileges he distributed — and as an abstract, pure mind. Guidobaldo's apparent 'uninterestedness' in the materiality of the gift was a ritualistic representation of his own social identity. His lack of interest was an expression of the ethics of waste typical of the aristocratic self.

Actually, Guidobaldo did get a little something out of Galileo's hiring at Padua. He asked Galileo "what stipend did they give you, because I would like to see you treated according to *my desires* and your merits".[75] This same statement recurs in almost an identical form in an earlier letter: "I wished to know whether Your Lordship has ever received a rise in salary, because I would like this to reflect *my desire* and your merits."[76] What these references to Guidobaldo's "desire" indicate is that he was testing his power through the client. Guidobaldo was clear in separating his own desires and power from Galileo's worth. To him, Galileo's stipend was a 'gift' he was giving him through his own patronage networks. Therefore, while matching Galileo's worth, the 'gift' had to reflect Guidobaldo's own power. Too low a stipend to Galileo in Padua would have damaged Guidobaldo's own honour in the same way as too low a stipend to Galileo as Philosopher of the Grand Duke would have been perceived as infamous for the Medici's image.

The gift acted as a probe. If the receiver was a person of high status, the gift was an honourable challenge. Conversely, if the receiver was unable to

reciprocate, the gift was a paternalistic gesture that tended to stress the power of the giver/patron. In the first case the gift was there to trigger a challenge of conspicuous waste. In the second case, the gift was a sort of monument to the patron — a fetish. This is why many of the official gifts, such as the gold medals Galileo received first from the Gonzaga and then from the Medici, carried the patron's effigy. In a sense, they were 'marks' of the client's 'belonging' to the patron.

The significance of gifts should not be perceived merely in terms of their economic value. They were signs of status and honour, elements of the aristocratic ethic of waste. As among the Tlingit of the American northwest, conspicuous gift-giving was a sign of the giver's disregard of value — of his heroicness. Gifts and duels obeyed a similar logic. The giver of important gifts, like the originator of a daring dispute, was perceived as a challenger, that is, as an aristocrat. One presented oneself as having status, honour, and, therefore, credibility. This makes clearer in what sense gift-giving was the logic of patronage. Patronage (like gift-giving) was more than an economic exchange: it was a statement of status, identity, and credibility. It was a process of self-fashioning.

Some of the gift-exchanging rituals were private and involved such presents as instruments, books, hospitality, letters of introduction, wine, dogs, paintings, wild game, seeds of exotic plants, invitations to parties and ceremonies, access to important circles, services, and privileges. Others — especially those given out by princes — were often part of a standardized etiquette of reception and reward at court.[77] Toward the end of the sixteenth century, the two dimensions of the gift — the symbolic and the economic — became more distinct and the second increasingly quantified. As noticed by Fantoni, gold medals and chains became a standardized gift, and the prince expected their clients to retain the gold medal carrying their image "to remember me" ("per ricordo mio") while selling the gold but non-personalized chain "according to your needs" ("per i bisogni vostri").[78] Gold chains came in sizes related to standard cash value, like two, three, or four hundred scudi.

The exchange of gifts commonly encountered in Galileo's correspondence and documents structured both his official contacts and private friendships. It does not seem that there were monetary transactions between Sagredo and Galileo, with the exception of loans considered as something outside of their friendship. Galileo was not shy in pressing Sagredo to lobby for his salary increase at Padua. Nor was Sagredo backward in asking to have his instruments fixed or manufactured gratis by Galileo's artisans, or in enlisting Galileo to fetch water from the spring of the Virgin of monte Artone and send it to Venice, to find a bottle of the "Sicilian's oil for wounds" he wanted to take to Syria, to send him a declinatorium, and, after Galileo's move to Florence, to find and send him (again gratis) a pair of exotic dogs.[79] On top of

these requests, Galileo quite frequently sent small gifts like wine, game, and truffles that were reciprocated by Sagredo with more wine or with seeds of 'special' melons from Syria.

The frequency and informality of the exchanges of gifts between Sagredo and Galileo may mislead us into regarding the entire process as just an expression of the friendship between the two. But 'friendship' had a very specific meaning in Galileo's time. As much recent historiography has shown, *amicizia* was a contractual bond ritualistically represented as informal.[80] Sagredo spelled out the contractual dimensions of his *amicizia* with Galileo on several occasions. In August 1602 he told Galileo:

> Our Mr Venier and myself want to take a short trip in Cadore this October ... but because this trip through wonderful places may turn boring without the company of Your Most Excellent Lordship, I decided to let you know ahead of time so that, to please the two of us, you can arrange things to do us this favour. *And whatever effort you take, we promise to do the same for you on the occasion of the confirmation of your post.*[81]

This directness in indicating the reciprocity of gift exchange is found elsewhere in Galileo's correspondence. In June 1604, Antonio de' Medici wrote Galileo that

> I understand that Your Lordship has a ball that, once thrown in the water, remains between the two waters. *I really beg you to send me one* ... and you can be sure I will consider this a very special favour, *and that your courtesy will be reciprocated.*[82]

Several years later, Antonio de' Medici would use a similar expression to ask Galileo for a newly invented telescope:

> I beg you ... to make one and send it to me. It will be regarded by me as a most special favour, and I will demonstrate to Your Lordship how much I appreciate this demonstration of your love ... *because, beside giving you back the necessary equivalent favour, I will feel eternally obliged to find the occasion to serve you.*[83]

As in the case of Antonio de' Medici, no important European aristocrat or upper clergy paid for the telescopes they received from Galileo, but, instead, reminded Galileo of the favours (the counter-gift) he would receive. For instance, Andrea Labia, acting as a broker to Cardinal Borghese, who did not know Galileo personally, wrote to him:

> You should know that such an instrument is so dear to him [Borghese] that if he receives one from you ... he will not only acknowledge the

> favour in writing *but you will soon know how much such a gesture may be rewarding to you.*[84]

Similarly, Duke Paolo Giordano Orsini told Galileo:

> Needing a telescope for my own pleasure ... I desire one coming from the hands of Your Lordship; and I beg you to do me the favour of sending it to me as soon as possible. *But with equal promptness, I offer myself to Your Lordship on all occasions you may wish or need me.*[85]

The *contracambio* mentioned by Sagredo, Don Antonio de' Medici, Labia, Duke Orsini, and Cardinal Farnese — who thanked Galileo by letting him know that he should "*capitalize* on the merit you have with me"[86] — was not a formality. Sagredo knew, and Galileo frequently reminded him, of the duties he had contracted by entering their friendship. Among the counter-gifts Galileo requested from him was an aggressive lobbying for the confirmation of his position at Padua and for recurrent salary increases. In 1599, a tired Sagredo coming back from one of the many discussions he had with Venetian officials on behalf of Galileo, wrote to him that he had complied with the rules of friendship:

> Since I have already satisfied abundantly enough the friendship I hold for you, *the obligations to you which I acknowledge* and the favour and help that true gentlemen try to extend to the virtuosi who deserve it ... I should finally desist and make sure that Your Most Excellent Lordship desist as well ....[87]

Even a friendship as informal and intimate as Sagredo and Galileo's was maintained through rituals of gift-exchange.

Even the Venetians' outrage at Galileo's departure from Padua can be seen as the result of his violation of a gift-related taboo. In August 1609 Galileo presented the telescope *as a gift* to the Venetian Senate. In the letter of presentation to Doge Doná, he even relinquished his right to produce telescopes. But in the same letter Galileo also indicated that tenure at Padua would have been an appropriate counter-gift.[88] By obtaining the counter-gift he had asked for (and much more), Galileo was bound by his honour to remain a client of the Republic of Venice.

By dedicating the satellites of Jupiter (which he had discovered with an instrument he had donated to the Senate) to the Medici and by leaving his generously rewarded and tenured position at Padua, Galileo broke the code of honour. He insulted the Venetians by sending back the generous gift he had asked for *after having accepted it*. There is some evidence that he did something worse. He did not, as was required by the customary etiquette,

provide a formal renunciation of his privilege of life-tenure at the University of Padua. Not only was tenure a very rare privilege, but it also had an important symbolic meaning that went beyond that of a safe job. By giving it to Galileo, the Venetian Republic transformed him into a life-long client, almost a kinsman. Therefore, it is not surprising that at the end of 1612 Sagredo could still write that "it is impossible to believe the disgust provoked by your departure, and in particular by the way in which people say you departed".[89] Formerly good friends of Galileo's like Venier felt so insulted as to threaten to break off relations with Sagredo if he kept on corresponding with Galileo.[90]

But if Galileo's violation of the ethics of gift-exchanging marked the end of his patronage relationship with the Venetian republic, it also set the beginning of a new one, that with Cosimo II. This new relationship was also developed around gift-giving rituals. Galileo paid all the expenses of the printing of the *Sidereus nuncius* and of the construction of the many telescopes ("produced with great expense and labour") he gave to Cosimo and to various European princes and cardinals.[91] It seems that Galileo tried to put Cosimo in his debt by distributing telescopes and copies of the *Sidereus* as gifts through the channels of Medici diplomacy, that is, by presenting them as coming from the Medici. Within his own limits, Galileo was trying to engage Cosimo in a potlach.

Galileo mentioned monetary contributions only in relation to a second and more luxurious edition of the *Sidereus nuncius* that was supposed to be in the vernacular rather than in Latin. He told Vinta: "I really think this second edition should reflect the greatness of the Patron rather than the weakness of the client."[92] Therefore, the Medicean Stars and the *Sidereus nuncius* were a gift to Cosimo in the most literal sense: Galileo did not get a penny for it. Moreover, he extended himself by giving presents to European royalty and upper clergy in the name of the Medici. The *Sidereus nuncius* was no commissioned art piece. And it was precisely because it was a 'pure' gift that it needed to be rewarded by the Medici with an adequate counter-gift.

At the beginning of the patronage relationship between Galileo and Cosimo we find another gift: the military compass and the related *Istruzioni.* As we have seen, it was the gift of the compass that allowed Galileo to get a hold on the prince by becoming his summer mathematics tutor. The Medici did not reciprocate Galileo's gift with cash, but with other gifts like black taffeta, a gold medal with a four-hundred scudi gold chain, hospitality at court, gifts of food during the summer visits to teach Cosimo, help in improving his stipend at Padua, and a job for his brother in law Benedetto Landucci.[93] Actually, it was important for Galileo *not to be paid* during those summers. That allowed him a higher status. His relationship of patronage with the Medici could be presented as voluntary, as based on a reciprocal exchange of gifts.

The two gift-exchanges most relevant to the development of Galileo's patronage relationship with the Medici display a similar pattern. For instance,

the Medici did not give a valuable object-like gift to Galileo in return for the compass and the dedication of its *Istruzioni.* Some black taffeta for a cloak could not match the value of Galileo's gift to the Medici. But they gave him a more prized gift, that of instructing the prince — a privilege that was not a job because, literally speaking, Galileo was not paid for it. Galileo's gift was reciprocated by letting him into a more personal patronage relationship. Something quite similar happened in 1610. Galileo offered the dedication of Medicean Stars to Cosimo, who reciprocated the gift with a gold medal and chain of relatively small value compared to the value of the Medicean Stars. But Cosimo's real reward did not come through an object-like gift, but rather by letting Galileo into a privileged patronage relationship by nominating him his First Mathematician and Philosopher.

Therefore, the beginning of a patronage relationship with a great patron seems to be marked by the patron's *not reciprocating the client's gift.* Instead, the patron accepted some sort of debt to be paid not *una tantum* but through a range of privileges scattered in time. In this case, the client's gift became an investment. In fact, it seems that the most conspicuous gifts were given when the patron did not want to enter into a closer patronage relationship.

That is what happened with Galileo and the Gonzaga in 1604. They did not give Galileo a position at court but reciprocated Galileo's gift of a military compass with a gift approximately seven times more valuable. Similarly, the several physicians summoned to Florence to give their opinions on the prince Don Carlo de' Medici's illness in the autumn of 1604 and on Cosimo II's illness in 1614 were treated like foreign aristocrats while in Florence and then loaded with gifts — among them the usual gold chain — and sent home in Medici carriages.[94] But although Galileo's friend Acquapendente was richly rewarded by the Medici on both occasions, he did not receive the position of *Protomedico* at the Medici court in 1607 when he asked for it through Galileo.

Therefore, generous gifts seem to have characterized non-continuous patronage relationships. In fact, all the gifts given by the Medici to Galileo (before 1610) and to the various visiting physicians fall in the standard categories of court etiquette regulating the *reception of visitors.*[95] This indicates that sporadic gifts from clients and counter-gifts from princely patrons were perceived as visit-related rituals. And, in fact, Galileo could be correctly perceived as a nomadic client who came to visit (and bring gifts to) the Medici once a year during the summer. Similarly, the rich gift from the Gonzaga came on the occasion of Galileo's visit to Mantua.

The more personal patronage relationships developed when the client stopped being a visitor and became a courtier — a member of the prince's *familia* — and when the patron reciprocated the client's gift not with valuable objects but with a contract and a stipend. In a sense, it was the client who, by giving important gifts, forced the patron into a patronage relationship —

a process not unlike the sale of titles. Under certain conditions, such an option was probably best for both parties.

It may have been more convenient to the Medici to give Galileo the much desired title of philosopher and a thousand scudi a year than to pay him back with a gift. What kind of gift could that have been? In fact, all Europe knew of Galileo's discoveries and that he had dedicated them to the Medici. And many important personages had been informed directly by the telescopes and copies of the *Sidereus nuncius* that Galileo had sent *as gifts* through the Medici diplomacy. In a sense, Galileo had trapped the Medici in a potlach. Cosimo's generosity and nobility was now under the scrutiny of all those kings, queens, dukes, and cardinals who had been given telescopic gifts by Galileo, and it would have been very difficult for him to devise an adequate counter-gift. The title and the stipend were probably the most convenient option.

Paradoxically, the image of the prince's power needed to be maintained by gifts from clients. But this scenario was not represented as the prince being in debt to his clients. By being in the position of choosing what gifts to accept, the prince was able to maintain a position of power in relation to the clients.[96] The prince maintained his power image by being in debt (of gifts) to those whom he accepted as clients, and by offering them in exchange the possibility of long-term privileges.[97] After having given enough to (or invested enough in) the prince, the client was given an annual dividend and/or a title. Galileo got both.

The place of gift within the logic of patronage explains the role of spectacular scientific production in Galileo's career. Galileo needed to produce or discover things that could be used as gifts to his patrons. The Medicean Stars are a perfect example, but their outstanding role in Galileo's career should not make us neglect the many other gifts he produced and distributed. His brokers at the Medici court kept reminding him to take "new things to show" whenever he visited Florence,[98] and Galileo tried to keep their attention by announcing in his letters some of the novelties he would bring.[99] The ball floating between two liquids requested by Antonio de' Medici, the armed lodestone for Cosimo, the various astronomical discoveries passed around in the form of enigmas (enigmas were literally considered as challenging gifts), the military compass, the mysteriously fluorescent *pietra bononiense*, Galileo's various books, the telescope, and the microscope were or could be presented as gifts.

Although not all of Galileo's discoveries or inventions were spectacular nor could they all be transformed into gifts, it is a fact that those which could be presented as *personalized* gifts — like the Medicean Stars — were the most rewarded. Also, we should not conceive of gifts as objects only. Confirming a pattern observed in so-called primitive societies, we find that Galileo's answers to problems posed by his patrons were perceived less as 'solutions' and more as 'gifts' to the patrons who asked them.[100]

VI. PATRONAGE AND SCIENTIFIC COMMUNICATION

The earliest known letter by Galileo dates from 8 January 1588. It was addressed to Clavius, and was delivered by Cosimo Concini, a Florentine patron of Galileo. Concini, the son and nephew of two Medici "Primi Segretari", was at that time a young Church official of Pope Clement VIII. Galileo told Clavius that by giving his reply to Concini, not only could he be sure that the letter would safely reach him in Florence, but he would also increase Galileo's credit with his patron. In fact, in receiving a letter for Galileo from a high-ranking Jesuit, Concini would realise the quality of his client's connections.[101] Although Clavius did not send his answer back to Florence via Concini, he wrote to Galileo that he would make sure to tell Concini of their friendship.[102] Even this earliest of documents, a simple exchange of letters on the centre of gravity of solids, involved interactions between clients and patrons or among different patrons with the exchange of status-signs.[103]

Such an example is by no means an isolated one. In May 1600, the same Concini — by then the Medici ambassador in Prague at the court of Rudolph II — spoke to Tycho Brahe about Galileo, a brilliant but then quite unknown Italian mathematician. And although at that time Tycho was interested in establishing contacts with Italian mathematicians,[104] Concini must have been effective at singing Galileo's praises if an arrogant aristocrat like Tycho decided to write Galileo for "amicitiae nostrae fundamina ponere".[105] More than just a contact among astronomers was being attempted here. Galileo did not ask his patron Concini to introduce him to Tycho; it was Concini who showed off with Tycho by talking about this great young mathematician client of his.

Galileo's correspondence offers several other examples in which patrons played an active role in establishing or maintaining communication among scientists. Scientific contacts were presented as part of a more general process of status confirmation or increase which worked for both clients and patrons. Then, as shown in the case of Concini at Prague, Galileo was not necessarily the engine behind these strategies. Contacts were often established by the patrons allegedly in the name of the clients, but actually for the sake of their own image.

As we will see, scientific disputes were triggered and managed by patrons for similar purposes. In early modern Europe (and in other non-European societies as well) to be worthy of being challenged was a sign of nobility.[106] Challenges were forms of gift (and vice versa). Although it was better to win a duel than to lose it, the very fact of being challenged was important *per se*, for it implied that one's status was recognized. Consequently, duels (and scientific disputes) were part of a social economy of honour and status. And, as we will

see, the line separating scientific contacts from challenges (i.e. disputes) could be very thin.

Another example of patron-controlled attempt to initiate scientific dialogue comes from Sagredo — Galileo's major patrician patron during the Paduan period. On 20 December 1602, he wrote to tell Galileo that the Venetian Senate (to which the Sagredo family belonged) was sending an official to England. Sagredo was planning to send a letter to Gilbert through the Venetian official and asked Galileo if he had any question about *De magnete* he would like to include in the letter.[107] Galileo's contribution would have been particularly welcome, for Sagredo admitted that he had not read *De magnete*. Therefore, in trying to put Galileo in touch with Gilbert, Sagredo was actually trying to show off through the skills of his client.

The role of the Medici ambassadors in distributing copies of the *Sidereus nuncius* and telescopes all over Europe is a further example of the role played by patronage in developing scientific communication. In fact, a number of those copies were passed by those princes on to their court mathematicians — Kepler and Zugmann among them.[108] Kepler's dedication of his *Conversation with the Sidereal Messenger* to Giuliano de' Medici (the Medici ambassador in Prague after Concini's transfer to the Spanish court) spells out some aspects of these patronage dynamics. Kepler acknowledged that he obtained a copy of the *Sidereus* from Giuliano de' Medici and that, when called to the Medici palace in Prague on 13 April, he was read Galileo's invitation to respond to the *Sidereus*, an invitation which was reinforced by the ambassador's "own exortation".[109]

It is important to note that Kepler never received such a letter from Galileo, but that it was *read to him* by the Medici ambassador. Therefore it was a kind of official request from the Medici to the Imperial Mathematician, and not a private communication between Galileo and Kepler. The official character of the *Conversation* is further stressed by Kepler's reference to the fact that Galileo was "in the employ of the Medici" and by Kepler's dedication of this book to "the ambassador of Prince Medici, Grand Duke of Tuscany, himself a Medici by birth" who had "sought this service from me".[110] Similarly, when in the spring of 1610 Galileo used Kepler's *Conversation* as a proof of the international recognition of his discoveries to remove the doubts subtly conveyed to Galileo by the Medici through Vinta, he did not refer to Kepler by name but called him the "Mathematician to the Emperor".[111]

The officiality displayed on both sides testifies that there were two dialogues finely modulated with each other going on at the same time. While Galileo was communicating with Kepler, Cosimo II was asking Rudolph II to confirm the existence of the Medicean planets. From such a confirmation, the Medici would improve their international image, but Rudolph would also have his

very high status confirmed since he (through his mathematician) had been given the status of judge of the matter.

Kepler and Galileo communicated as clients (and therefore representatives) of the Emperor and the Grand Duke and not as scientists. Similarly, Galileo did not write to Gilbert. The actual chain of communication was: Galileo to Sagredo to Venetian Senate to Gilbert. Galileo's message was legitimized by his patron. Galileo did not use pre-existing diplomatic communication networks simply because they were convenient. If we stick to an utilitarian perspective we miss a more complex picture. Giuliano de' Medici or Sagredo were not mailmen. Similarly, as we will see soon in the debate on the sunspots, Galileo and Scheiner did not communicate directly, but rather through Cesi and Welser. And the role of Cesi and Welser was not that of transmitters, but of legitimizers and publicizers of the debate. It was through their involvement that the debate became public and legitimate.

In strongly status-bound societies such as those characteristic of early modern Europe we cannot separate status from credibility. The use of diplomatic connections — of diplomats who partook of the 'sacredness' of the prince they were representing — gave Galileo credibility.[112] And it was through patronage that Galileo had access to Concini, Sagredo, and Giuliano de' Medici. If it is a little naïve to consider scientific credibility as related only to peers' recognition even in modern science, such a view would be totally misleading in interpreting the construction of scientific credit and legitimation in early modern science. I think it would be useful to suspend for a moment the widespread and 'natural' belief that Galileo, Kepler, and Clavius earned their titles because of their credibility and the quality of their scientific work. As a thought experiment, we may think, instead, that they gained scientific credibility because of the titles and patrons they had.

VII. PATRONAGE AND SCIENTIFIC DISPUTES

The relationship between social status, honour, and credibility that has been traced above is reflected also in the structure of early modern scientific disputes which, in fact, resembled that of duels. And this is not a conclusion derived from Galileo's correspondence alone. For instance, in the case of the dispute betwen Tycho and Ursus, it does not seem that Tycho perceived clear boundaries between personal challenges and scientific disputes. A detailed analysis of the dispute has been presented already by Jardine and Rosen.[113] For the purpose of this argument it is enough to focus on the behaviour of the participants rather than on its subject matter.

Tycho perceived that Ursus's claims were a challenge not only to his own honour but to that of his *country and family*.[114] He did not see it as a priority

dispute but as a plain insult, to be dealt with according to the code of honour to which aristocrats like him were bound. If Ursus had been of noble rather than peasant origins, Tycho would have probably challenged him to a duel. In this case, as in the later priority dispute between Galileo and Capra about the invention of the military compass, 'honour' rather than 'scientific credibility' were presented as being at stake.[115]

Kepler — who happened to have been embarassingly implicated in the dispute by Ursus's publication of an older flattering letter Kepler had sent him years before — was pressed by his patron Tycho to refute Ursus's claims and restore his honour. But Kepler tried to avoid the unpleasant task by convincing Tycho that his nobility would be better displayed by ignoring the matter altogether.[116] Kepler's argument may reflect an opportunistic attitude, but it was an acceptable one. In fact, according to the contemporary code of honour, any form of answer from Tycho's side would have been perceived as an implicit acceptance of the challenge from Ursus — a recognition he did not deserve. Also, Tycho tried to have Ursus prosecuted legally. But he did not perceive him as guilty of a mere violation of intellectual property. Ursus had stained his honour, and Tycho seems to have thought that Ursus should have been sentenced to death.[117] He convinced the Emperor Rudolph II to set up a committee of two jurists and two barons (rather than two mathematicians) to investigate Ursus's crime. Unfortunately, we cannot know what the sentence would have been for Ursus died before the end of the investigation. However, his books were sequestered and publicly burned.

Tycho's example cannot be easily dismissed by attributing his behaviour to his well-known hot temperament. For instance, the *cartelli di matematica disfida* exchanged between Tartaglia and Cardano via Ferrari reflects the same pattern as the Ursus–Tycho dispute. Tartaglia saw his 'honour' (or rather 'honesty') to have been challenged by Cardano's not reciprocating his gift of the solution of third degree equations. Consequently, he challenged Cardano, who — being of a much higher socio-professional status — did not accept the challenge but passed it on to his 'Kepler', that is, to Ferrari.[118] In the same way, Commandino's use of Tommaso Leonardi in his attacks on Tartaglia can be seen as a result of the gap between his aristocratic status and that of Tartaglia.[119] Similarly, in 1611 Cesi and Cigoli pressed Galileo to have a student or a friend answer the many attacks on the *Sidereus nuncius*, because — although the level of the challengers was not worth his honour — the challenge should not have gone unattended.[120] Pierre Bourdieu has found that in North African Kabyle society, noble families keep a 'poor man' on their household for the specific purpose of passing on to him the challenges the family receives from lower-class people.[121] Passing the task of responding to a challenge to a lower-status client was not just a way of matching the status of the opponents; it could be used deliberately as an insult. The intricate pattern

of exchanges of personae between Galileo, Guiducci, Grassi, and Sarsi that led to the publication of the *Assayer* is a good example of these dynamics.

Because the social role of the scientist — and the ethics associated with it — was in the process of being formed, *the notion of scientific credibility had not yet speciated away from that of honour*. This confirms the relationship between patronage and scientific credibility. Indeed, honour (like scientific credibility) was closely related to social status, and social status could be gained through patronage.

The example of Tycho and Kepler refers to situations in which the patron — the one who had status — was himself a mathematician. But the duel-like structure of scientific disputes was displayed also when patrons triggered scientific disputes for the sake of their status and image. In such cases, mathematicians were summoned as the champions of their respective patrons. As in the case of scientific communication, challenges did not usually take place *directly* between scientists, but between scientists as representatives or champions of their patrons.

Not only did patrons trigger disputes, but they often acted as arbiters in them. Although they may have endorsed their champions, patrons did not have as much at stake in the dispute as did their clients/champions. Victories were better than defeats, but to trigger a challenge or to have one's champion challenged was already honourable to a patron — it was a gift. Often, their courts and salons were the location of academic disputes which contributed to their visibility. It seems as if patrons (especially important ones, who were more concerned with the maintenance rather than enhancement of their status) thought statistically. If their champion did not win one game he would win the next.[122] Therefore, what interested patrons was the 'good sport' displayed during the 'duel' rather than the bloody ending.[123] The aesthetics of the 'good sport' can be traced in the fact that scientific disputes — when played out at court — tended to resemble theatrical plays. At the dispute on buoyancy at the Medici court in 1611, Cardinals Barberini and Gonzaga participated as actors in it. One sided with Galileo, the other with the philosopher Papazzoni.[124] Similarly, it does not seem that Urban VIII had the *Assayer* read to him during meals because he was excited by its technical content, but because of the pleasure he derived from Galileo's witty style. Apparently, the section Urban loved the most was the "fable of sound".[125]

This may help us understand why certain disputes (like that on the floating bodies at the Medici court in 1611–12) did not end with a winner and a loser. Patrons did not have any specific interest in ending a dispute if it kept offering a good spectacle. Disputes were instances of courtly games.[126] Similarly, disputes could simply die off because of their becoming uninteresting without any of the contestants having been crowned the winner. It is interesting that Cosimo II does not seem to have discussed with Galileo the technical details of

the dispute on buoyancy, but instead criticized him for his improper conduct in the dispute.[127] Quite probably, at that time Galileo had not yet fully internalized court etiquette.[128]

Galileo's early correspondence informs us of a number of disputes triggered and administered by patrons. For instance, the debate on the sunspots was initiated by Mark Welser and fostered by the Lincei, while that on the floating bodies was managed by Cosimo II. But we also find references to other less important or shorter disputes, like that Sagredo tried to trigger between "his friar" (Paolo Sarpi?) and a Jesuit mathematician from Ferrara, Rocco Berlinzone, in the spring of 1608.[129] Similarly, the *Assayer* developed from a question on the nature of comets posed to Galileo in 1618 by the Archduke Leopold — a patron of his through family connections with the Medici. Galileo's answer then triggered a debate in which he was then largely held, or rather pushed forward, by his Roman patrons. As shown by Galileo's correspondence of the period, Cesi, Cesarini, Ciampoli, and the other Lincei became increasingly vocal in reminding him of his duty to write the *Assayer* in response to the Jesuit Grassi's attack on his views on comets.[130]

Mark Welser was the engine behind the dispute on sunspots. He wrote to Galileo for the first time in October 1610 enclosing with his letter a critique of Galileo's description of the lunar mountains by a physician from Augsburg, Georgius Brengger.[131] Welser was a patrician, a major patron of the arts and a political figure in Augsburg, a correspondent of Kepler, a good friend of Clavius and of other Jesuits, and an important financier of the Emperor Rudolph II. Apparently, he went bankrupt when Rudolph refused to pay him back a major loan.[132] Probably because of his political and financial status, Welser was on good terms with the Medici. His first letter to Galileo was delivered by Curzio Picchena, a Medici *Segretario* and a good friend of Welser.[133]

Once more, we find that scientific correspondence was 'politically legitimized'. Brengger and Galileo engaged in a dialogue through their patrons — Welser and the Medici. Evidently, Galileo *had to* respond to Brengger's letter — he had to reciprocate this gift to his fame coming from north of the Alps. And, in fact, it was as a gift that Welser presented Galileo with Brengger's critique of the *Sidereus nuncius*:

> I have gladly complied with the desires of a friend of mine by sending you the enclosed paper, because I thought that it would be not unpleasant to see that even here beyond the Alps your books are being read with great attention, *and that the very existence of disagreement testifies to this* ....[134]

And Galileo acknowledged Brengger's critique as a gift from Welser, a gift that (as he said) turned him into a client of his:

> I have always sought the occasion to dedicate myself in service to your great virtue. Therefore I was most happy to receive from you the critiques from the most erudite Mr Brengger. In fact, even in case his criticisms prove unanswerable, I would still be more pleased by the errors in my work than by the truths *since it was through my errors that I gained such a great patron* ....[135]

A patronage relationship was established through the gift of a challenge — an offer that, as the saying goes, Galileo could not refuse. Welser was not a patron one could dismiss easily. Not only was his economic and political power remarkable, but he was very well connected to the Jesuits and to Clavius in particular. As we can see from Cesi's later concern to enlist Welser among the Lincei, he was somebody one did not want to have as an enemy.

Galileo and Welser went through a similar 'symbolic exchange' about a year later, in January 1612, when Welser wrote to Galileo to inform him of the observations of the sunspots made by a client of his, the Jesuit mathematician Scheiner, who — under the pseudonym of "Apelle" — had published his discoveries in the form of three letters addressed to Welser.[136] An exchange of letters between Galileo and Apelle via Welser followed.[137]

Apelle's observations were presented to Galileo as challenges to his priority in the discovery of the sunspots as well as to his ability to interpret them. Nevertheless, they were not presented as 'wild attacks', but rather as gifts or tributes to Galileo's fame. Welser claimed that Galileo had broken the ice with astronomical discoveries and it would have been cowardly for German mathematicians not to take up the challenge.[138] What Welser suggested was that Galileo's discoveries had been perceived both as gifts and challenges which — by having been met — reinforced Galileo's honour. Similarly, Welser saw Galileo's critical replies to Apelle as tributes as well. He thought that one of Galileo's answers "seems written with reasons so good, solid, and explained so properly, that Apelle — although you contradict most of his opinions — *should feel much honoured*".[139]

A crucial role of the patron in creating and managing scientific disputes emerges in these ritualistic exchanges between Galileo and Welser. Galileo did not perceive Brengger's and Scheiner's critiques as gifts coming from them *but from Welser*. Similarly, Brengger and Scheiner were not receiving Galileo's 'gifts' directly from him but rather from Welser. Welser was more than a *trait d'union*. His power — and the fact that both contenders were clients of his — warranted the legitimacy of the exchange. What in a different context would have appeared as wild attacks were given the legitimate status of duels or gifts through the recognition of the challenger's honour.

More precisely, the patron played a double role in the dispute. He both legitimized the contenders *and forced them to engage in the dispute*. If they did

not, they would put themselves on the same level of those people who — although having honour — did not reciprocate gifts or did not accept challenges to duels. They would lose not just a patron but their 'face' as well — and they must have had some if they were able to enter a patronage relationship with an important patron.

In a sense, the high status of the patron was transferred to the mathematicians, who in that given social structure may not have had status and honour enough as private individuals to make them eligible for challenges. It was this transfer of honour from the patron to the client that bound them to the aristocratic ethics of the duel — ethics that they would not necessarily have had to adhere to as particular individuals. For instance, according to Sagredo, the 'duel' he was trying to set up between "his friar" and Rocco Berlinzone failed to materialize because Berlinzone could get off the hook (without losing his honour) by claiming that the friar was a heretic, and therefore not worth challenging (because he was honour-less).[140]

This analysis of the patronage dynamics through which status and honour were conferred upon mathematical practitioners so as to bind them to a 'professional ethics' they could not have had as members of a (non-existing) socio-professional community is confirmed by Galileo's parameters in accepting critiques. For instance, he did not answer Delle Colombe, Horky, and Sizi's attacks on the *Sidereus nuncius*, that is, he dismissed all those works that were not dedicated and protected by patrons Galileo could not ignore. Similarly, the dispute on buoyancy at the Medici court in 1611–13 offers evidence of how dedications to important patrons were arranged in an attempt to force the adversary — Galileo in this case — to answer.[141] And it is also interesting that Delle Colombe, after having seen his *Against the motion of the Earth* dismissed by Galileo, tried to force Galileo into a dispute on the irregularities of the Moon's surface by having his views endorsed by Clavius and by circulating them among high Church officials like the Cardinal de Joyeuse — patrons Galileo could not dismiss.[142] Similarly, the Roman philosopher Lagalla manoeuvered unsuccessfully to have Galileo answer his critique of the *Sidereus nuncius* — the *On the phenomena in the orb of the Moon* — through his patron Cesi: "Lagalla wants a reply and has pressured me to write you on this matter ... so that he could have full satisfaction."[143] And these dynamics were by no means limited to the Italian context. The so-called Leibniz–Clarke correspondence seems to reflect similar strategies. What Leibniz did a century later to force Newton into a debate was to address him indirectly by sending his critiques to a common patron Newton could not dismiss — Carolina, the Princess of Wales.[144]

Welser's behaviour during the dispute on the sunspots shows another crucial aspect of the patron's role: *the patron acted as the arbiter of the dispute rather than as an ally of one of the contenders.* A sign of the patron's

impartiality can be read in the way the 'disputed' texts were dedicated. Usually, both contenders dedicated their works to the same patron. For instance, not only did Welser accept the dedication of Scheiner's work, but he also asked Galileo (and a number of common friends) for permission to publish his responses to Apelle/Scheiner.[145] Although Galileo's letters were ultimately printed by the Lincei, Welser remained the undisputed pole of the dispute, for Galileo had already written his replies to Apelle in the form of three letters to Welser. The centrality of Welser's role in the dispute was further confirmed when the Lincei reprinted Apelle's previous letters to Welser together with Galileo's.[146] Welser himself became a member of the Lincei during the dispute.

The dispute on floating bodies which reached its climax at the Medici court just before the beginning of the dispute on the sunspots displays a similar pattern of centrality for the patron — in this case Cosimo II. All the contenders were clients of the Medici. Galileo dedicated his *Discourse on bodies in water* to Cosimo II, while his opponents dedicated their replies to various other members of the Medici family.[147] Similarly, Prince Leopoldo de' Medici received the dedication of the texts by both Huygens and Divini that framed the debate on Saturn's rings.[148]

However, the patron did not feel obliged to side with any of the positions expressed in the texts dedicated to him. The patron was at the centre of the dispute, but he was not necessarily the needle of the scale. And when patrons were put in that position — as in the case of Prince Leopoldo, who was elected by Huygens as judge of his hypothesis about Saturn's rings — they tried to get out of it as elegantly as they could.[149] Although the acceptance of a dedication implied some acknowledgement of the relevance of that text, it did not mean that the patron turned into an ally of the client from whom he had accepted the dedication. People who bet on fighting cocks do not avenge them in case they get killed. Similarly, although Cardinals Barberini and Gonzaga took sides on the dispute on floating bodies at the table of Cosimo II, they did not pursue Galileo or the philosopher Papazzoni once the meal was over.

Welser's behaviour fits this pattern. He maintained a quite ambiguous attitude about the truth of Galileo's claims, not only during the debate on sunspots but also in connection with the *pietra bononiense* and Galileo's early replies to Brengger.[150] He did not praise Galileo's replies as necessarily true, but rather as well argued, very convincing, clearly explained, and very enjoyable.[151] The aesthetics of 'good sport' is especially noticeable in Welser's remarks, but can be found elsewhere in Galileo's correspondence as well. For instance, the letters written by Antonio Querengo to Alessandro d'Este describing Galileo's visit to Rome in 1616 indicate a similar attitude. He begins by describing Galileo's brilliant performances ("discorsi stupendi"[152]) in the Roman salons:

> Your Most Illustrious Highness would take great pleasure from listening to Galileo arguing, as he often does, in the midst of fifteen or twenty adversaries as they attack him cruelly .... He stays there as if he were in a fortress and laughs at them, *and although the novelty of his doctrine is not convincing*, he demonstrates the vanity of most of the arguments with which his opponents try to defeat him. On Monday ... he performed wonderfully; and what I liked most of all was that — before answering the adversaries' arguments — he amplified and reinforced them with apparently very powerful evidence which then made his adversaries look more ridiculous when he eventually destroyed their positions ....[153]

But Querengo's excitement at Galileo's argumentative skills rather than at the truth of his doctrine did not last long. Two months later Copernicus was put on the *Index* and the pious Querengo wrote back to Alessandro d'Este that

> The disputes of Mr Galileo have vanished like alchemic vapours since the Holy Office has declared that those who uphold that opinion [Copernicus's] go manifestly against the infallible dogmas of the Church. We are reinforced in our belief that by avoiding spinning tops in our brains, we can stay still and in our place rather than flying with the Earth like many ants on top of a balloon in the air ....[154]

But it would be wrong to see Querengo's shifting attitude about Galileo as the result of a courtier's opportunism. Querengo's shifting of views is typical of patronage. Confirming what we have seen previously with Welser, Querengo did not take sides with Galileo, but appreciated the good show he produced so long as he was allowed to produce it.

It is interesting to notice that although Welser's lack of commitment to either of the contenders was essentially a statement of his *power*, it was presented as *objectivity*.[155] The gap in social status between Welser and his competing clients — a gap that allowed him to avoid commitment or prevented him from doing so — was presented as disinterestedness.[156] A *distance* between different levels of *social status* was represented as that *distance* which allowed for *objectivity*. The patron was forced into his position of arbiter (rather than ally) because his high status prevented him from allying himself to one of his lower-status clients. Even when patrons excused themselves because of their lack of specific competence, those statements did not reflect humility but social boundaries. Being competent meant being 'professional', that is, *technical*. But patrons were gentlemen, not technicians. Therefore, what was presented as *the patrons' impartiality* was actually the manifestation of a *social boundary*.

VIII. FROM PATRONAGE TO INSTITUTIONS VIA EXPERIMENTS

As an hypothesis, I suggest how these considerations on the dynamics of scientific patronage may help us understand the conditions of development of epistemological authority in later scientific institutions. With some non-trivial approximation, we can say that in the scientific academies the flesh-and-blood patron was replaced by the *persona ficta* of the corporation. It was no longer the status and honour transferred from the patron to the client that bound him to participate in scientific disputes, but rather the client's own membership in the scientific corporation and the ethics associated with it. But the patron's epistemological legitimacy resulting from the 'status distance' between him and his clients was maintained, although in a modified form, even within the scientific institutions.

As we have seen, a patron who managed a scientific dispute was represented not as a judge but as a idols-free arbiter. Instead, scientific academies passed judgements on scientific matters. This signified a fundamental socio-professional emancipation of the practitioners, because their own institutions were able to 'internalize' (as corporations) the epistemological legitimacy previously assigned to patrons only. Scientific corporations could now pass judgments because credibility — at least theoretically — became related to scientific competence rather than to social status.[157] Therefore, the distinction between patrons and clients — the distinction which prevented the patron from taking sides with one of the clients — was eliminated. But the epistemological legitimation that went together with that distance/distinction was maintained. In fact, it was the 'distance' between the institution and each of its members that legitimized the representation of contingent scientific judgements as objective ones. The institution was 'above' its members. It was between them and the king — the ultimate (but not participating) patron.

Discoveries or critiques were no longer delivered in the form of letters addressed or dedicated to a patron, but were now sent to the secretary of the academy. They became *transactions* or *memoirs*. The intermediate stage of this transition from letters to journals is offered by the Lincei, who planned to publish their works as a *Volume epistolico*.[158] Although the secretary (or president) of the later academies was not the patron of the institution, he represented its authority. Like Kantorowicz's medieval kings, the secretary had two bodies: one physical, the other corporate. The legitimacy of the academies was rooted in this distance between the corporate and the individual dimensions of the institutions.[159]

The early academies such as the Lincei and the Cimento show the intermediate phase of this process. Neither of them was an actual corporation. Rather, they can be seen as specialized types of courts or salons. We do not find a secretary but a prince. We are still within the framework of patronage.

But although the patron is still at centre stage, he would not remain there for much longer. In fact, in both the two main late seventeenth century institutions, the Royal Society of London and the Académie des Sciences of Paris, the patron is, at best, a non-participating one.

The introduction of experimental practices in the life of academies was crucial in this transformation. Leopoldo de' Medici's involvement in the debate on the nature of Saturn's rings is a good example of this process. Huygens dedicated the work in which he presented his theory on Saturn's rings to Leopoldo, asking for his opinion. Leopoldo decided to avoid a direct, personal response, but instead ordered observations and experiments on models to be made. Fifty years before, his father — Cosimo II — had tried to end a dispute at court not by ordering experiments, but by pressing Galileo to put his views in writing. He had thought that oral disputation was not the proper genre for the Grand Duke's First Mathematician and Philosopher. Years later, Leopoldo chose the experimental approach for similar etiquette-related reasons. It is not that Leopold adopted that strategy only because experiments were epistemologically the most rewarding approach to the problem, but because they were the form of inquiry that was closest to the 'objectivity' attributed to and expected from a man of his rank. It was the form of inquiry that reduced to a minimum the possibility of empty or aggressive argumentation — that typical of the lower classes.

But I am not saying that experiments were simply a convenient ritual for aristocratic virtuosi. Rather, I am trying to add a further dimension to the interpretation of the flourishing of experimental practices within the early scientific institutions. Experiments were not just the best way to produce new knowledge, to entertain and attract academicians, to keep clear from accusations of religious or political unorthodoxy, and to produce a platform of collectively acceptable data upon which the academy's collective work and dialogue could be based. *Experiments were also the best way out of the deadlock of non-committal arbitrage typical of patronage.*

And there were not many alternatives. The patron's non-commitment was both a problem and a crucially positive feature of patronage. The patron's non-commitment was tied to the very structure of patronage relationships which made these disputes legitimate (if irresolvable). One could not make them resolvable by rendering them illegitimate — that is, by getting rid of the hierarchies of social status that framed them. Experiments turned out to be the epistemological ritual fitting that specific social context. They allowed aristocratic patrons to make judgements without risking entering the polluting domain of opinions and emotional arguments. They preserved the intellectual purity typical of patrons' status while offering a viable method of terminating scientific discussions. In short, experiments were a practice which allowed for the transition from scientific patronage to scientific institutions — from spec-

tacular but not necessarily terminable disputes to spectacular but manageable discussions. All this while preserving the matrix of social status and credibility that was at the base of both scientific patronage and institutions. In this sense, we may say that experimental practices were not only an effect but also a cause of the development of scientific institutions.

To conclude, behind a major change in the organization of scientific life and method we find a continuity at the level of dynamics of social status and cognitive legitimation. Experiments allowed for decisions while avoiding status pollution. An amazingly fitting ritual, experiments allowed for the constructive management of distances in social status.

IX. GREAT GIFTS AND CLAIMS OF OBJECTIVITY

The relationship between differing social statuses of clients and patrons and the clients' ability to present their work and method as legitimate and 'objective' needs further attention. Interesting considerations emerge by looking at situations in which the patron's status was *very* high compared to that of the client. They may give us a key to understand Galileo's apparently fixational desire to move to the Medici court.

In their study of how the French university system works, not just as an educational institution but as one which reproduces social structures and hierarchies,[160] Bourdieu and Passeron have presented an analysis of the sociogenesis of the myth of the autonomy of academic knowledge. According to them, the "illusion of the absolute autonomy of the educational system" is strongest when the professors are no longer paid piecemeal by their students but become a structured professional body dependent only upon the state. This is the scenario in which the 'ideology of disinterestedness' develops best. Such ideology is functional for both the professors and the state. By claiming the total autonomy of their cultural productions, the professors present their knowledge as 'pure' and 'disinterested', and therefore non-arbitrary and legitimate. The more they claim their autonomy (also from the state), the more they serve the interests of the state, which uses the university and the culture it reproduces to reproduce, in turn, social structures and hierarchies. But such reproduction is hidden by the very fact that it is presented as education into 'pure' culture. Briefly, 'purity' develops out of the replacement of the particular students by the state as the professors' patron.[161]

Alain Viala's study of the emergence of the literary author as a legitimate profession in seventeenth century France introduces a distinction between ranks of patronage relationships: *clientelisme* and *mecenat*.[162] Usually, *clientelisme* developed around small patrons. Their clients (tutors or historians) performed fairly routine and low-visibility tasks and were usually paid piecemeal. These clients tended to chose low-risk, low-speed career strategies.

The client-patron bond was generally weak and clients of such patrons tended to enter simultaneously into a number of patronage relationships. Texts produced within such patronage relationships were usually mainstream.

Mecenat was something very different from *clientelisme*. It was much rarer too. Great patrons (the King or a *Grand* like Condé) were interested in brilliant, controversial, high-visibility, and *galant* authors. These writers were not rewarded through salaries and were not asked to work in the sense of taking care of specific tasks. They received "gratifications". Clients of such patrons were expected to be loyal to them. They were their patrons' champions. Their careers were of the high-risk, fast-track type. They achieved the status of nobility also because their 'cultural aggressiveness' was perceived to fit the aristocratic ethics and aesthetics: "In fact, we can properly speak of *literary heroism*: his glory as writer granted him nobility in the same way military exploits had formerly turned a free man into a knight."[163]

Again, as with Bourdieu and Passeron's university professors, Viala's writers were perceived as being noble or disinterested by serving one great patron instead of many petty ones. Great patrons needed to represent these clients as nobles because, being aristocrats themselves, the patrons could not have their status confirmed by means of people (clients) who were perceived to be paid by them to do so. Great patrons wished to present the relationship with their clients as a voluntary rather than a utilitarian one. As with the university professors and the state, the mutual interest of Viala's patrons and authors was better served when the material, economic dimensions of the patronage relationship were kept hidden or even denied.

In a statement that reminds us of Galileo's letter to Vinta, Michelangelo was proud to claim that never in his life did he have to open a workshop (*aprire bottega*), but that he always worked at court, where he had only one princely patron rather than many much less important ones.[164] Similarly, he claimed that he was *not* a painter or sculptor in the sense that term had in association to urban guilds. Like Viala's *écrivain galant* who did not want to be identified with clerks, or Galileo who asked for the title of 'Philosopher', Michelangelo wanted to stress his uniqueness.

And it is not accidental that the Renaissance artist who achieved the greatest status of all — one who was called 'divine' — was one who developed a quite dialectical patronage relationship with the most important Maecenas of the time (the Pope) and who repeatedly denied the utilitarian, economic motivation of his work. The myth of the artist which developed around Michelangelo's 'divinity' (like the other myths developed around academic 'autonomy' and writers' 'nobility') was one which benefited both artists and patrons by elevating art and making it a more prestigious status symbol for patrons. The

Florentine *Accademia del Disegno* was the institutional embodiment of such an ideology.[165]

If we now look back at Galileo's career strategies, and at the many letters exchanged with Vinta where the conditions for Galileo's move to the Medici court after his spectacular and controversial telescopic discoveries are discussed, we see that they perfectly fit the pattern outlined with these three examples above. The analogy between Galileo and Michelangelo (also in relation to the academical use of their images) is telling.[166] What attracted Galileo to Florence was not only nostalgia, a great salary, and no teaching load, as sound common-sense interpretations have been telling us. It was the probably unique chance to become a 'Philosopher' — the Michelangelo of mathematics. But the most interesting aspects of this process are those related to the status of Galileo's discipline.

By finding a patron *whose status was great enough to oblige him to repress the economico-utilitarian link between himself and a high-visibility client, Galileo was able to present his discoveries as a result of a 'disinterested' and therefore 'objective' endeavour* (rather than the opposite, that is, 'mechanical', as mathematics was usually considered). It was by means of this repression of the utilitarian dimensions of patronage to which Cosimo's honour was bound, that Galileo could claim the purity and objectivity of his approach and the truthfulness of his findings. Galileo's representation of his method as objective was the result of the same patronage dynamics which produced Michelangelo's 'divinity' or Viala's writers' 'nobility'. And the three examples show a relevant common denominator: they all exemplify the patronage dynamics that allow for the legitimation of a *new socio-professional role*.

I want to stress that this type of social legitimation could take place only when a high-visibility client and a great patron got together. To engage in this peculiar form of patronage, the client must offer something very unusual, new, and controversial (so as to qualify him as a 'challenger', a 'knight'). And to be perceived by a great patron as 'noble' enough to qualify for a 'voluntary' relationship (almost a kinship) with him, the client must be challenged by many 'worthy' people. Galileo certainly qualified on these grounds. Also, he was challenged on an issue related to the very 'honour' of the Medici dynasty: the Medicean Stars. In a quite literal sense — once Cosimo accepted Galileo's *gift* of the dedication — he turned Galileo into a Medici defender. It is not insignificant that Vinta called Galileo's dedication of the satellites to the Medici a "generous and *heroic*" gift.[167]

Galileo was bound to defend his prince's honour — which he did in the best possible way, that is, conspicuously and successfully. Hence, Cosimo's 'ennoblement' of Galileo as his 'scientific paladin', that is, *Filosofo e Matematico Primario del Granduca di Toscana.*[168] In this sense, Galileo's nomination was

already implied (unless he should 'die' duelling) from the time of Cosimo's acceptance of the dedication. And Cosimo did not accept such a dedication just because of the spectacular nature of the discovery, but because of the fundamental role that Jupiter played in the recently developed mythology of the Medici family. In fact, Jupiter was an emblem for Cosimo I, the founder of the dynasty, and the Medicean stars were perceived as emblems of Cosimo I's dynastic roles. They could be represented as both emblems and a sort of 'scientific demonstration' of the 'naturality' of the Medici rule as well as of the fate to which the Medici were bound, that is, to dynastic continuity.[169]

In this game of mutual legitimation Galileo could not bind any other patron better than the Medici. They had a stake in stressing Galileo's 'nobility' and disinterestedness in order to legitimize his discoveries; in turn these would have legitimized and naturalized his very conspicuous contribution to the Medici self-legitimizing dynastic imagery. The analogy with the symbiotic relationship (analysed by Bourdieu and Passeron) between the state's concern with the reproduction of social structures and hierarchies, and the professors' desire to have their culture be represented as 'autonomous' is quite telling here.

And Galileo could not obtain such an 'ennoblement' from any patron lesser than Cosimo II. That is what he told Vinta when he described to him his dissatisfaction with the employment conditions he experienced with the Venetian Republic. As he saw it, the problem was not with Venice but with republics in general. The employment conditions Galileo requested from the Medici did not describe the life style of a proto-scientist but that of a *noble*. For instance, the reason he did not want to teach, was not simply related to his desire for free time to dedicate to his research. Instead, he pointed to an issue of status: he did not want to be *obliged* to work like a mechanical person. Also, he did not want to teach *many* 'generic' students, but *only* his Signori when they desired to benefit from his teachings.

Actually Galileo succeeded in obtaining the status of a nobleman at court because — on top of the title of 'Philosopher' — he managed to be included in the category of *Gentilhuomini senza provisione* (people of patrician status who had full access to court but were not paid as court workers) rather than in the category of *Artisti, architettori et altri manifattori* (in which we find artists, craftsmen, engineers, architects, teachers of mathematics, and geographers).[170]

This link between great patrons, high-visibility controversial clients, and the disinterestedness (or objectivity) consequently attributed to the client's cultural production may explain Galileo's concern (which he shared with Michelangelo) in later trying to develop a patronage relationship with the greatest patron of his time — the Pope. Unfortunately for him the hope for a 'total legitimation' was unrealized — he lost that duel.

X. PATRONAGE AND COMMITMENT TO A THEORY

With this analysis of patronage in mind, I want to go back to Westfall's claims about the tension between Galileo's commitment to Copernicus and his concerns with patronage.

After tracing the pattern of Galileo's early strategies to move from the University of Padua to the Medici court in Florence, Westfall focuses on the extraordinary event that achieved such desires: his telescopic discoveries of 1610. But at this point Westfall detects a tension (or rather an incompatibility) between Galileo's patronage-related use of the telescopic discoveries and his alleged commitment to seek the proof of the Copernican hypothesis.

These two concerns are presented as pulling Galileo in two different directions. According to Westfall, it took Castelli's letter of 5 December 1610 to wake up Galileo's latent Copernicanism by pointing to the Copernican implications of the phases of Venus.[171] Until then, patronage-related concerns had somewhat monopolized Galileo's mind. Back in properly scientific (that is, Copernican) track, Galileo observed the phases of Venus with the telescope, and turned such a discovery into a strong anti-Ptolemaic argument. But, quite unethically, Galileo did not share the credit for the discovery with his student (and client) Castelli. Although patronage seems to be the central theme of Westfall's detailed analysis, it does not manage to become a privileged historiographical category. As he puts it: "Patronage cannot provide the universal key to an understanding of the social history of the Scientific Revolution."[172]

That patronage is perceived by Westfall as a sort of danger for the rational mind (though an appealing one) is shown by his use of the term 'alchemy' in relation to it. According to him, Galileo, lured by the pleasures of the Medici patronage, turned (or was turned) away from 'real science', considered the telescope "more as an instrument of patronage than as an instrument of astronomy"[173] and forgot about the search for proofs of Copernicanism until he received Castelli's letter.[174] Westfall's interest in such a letter goes beyond issues of priority in scientific discoveries. Actually, it is made to play a 'providential' role in his narrative (and in Galileo's scientific career according to that narrative). With his mind clouded by the alchemical vapours of patronage, Galileo was drifting away from science, but it was his humble disciple Castelli's letter which reminded him of his call. Quite appropriately for a friar, Castelli played on Galileo's (Copernican) conscience.

Westfall's narrative is based on the *assumption* of (1) a Copernican call and conscience in Galileo, (2) a deviation from the path dictated by that conscience or call, and (3) the redemption that follows the re-emergence of the conscience's voice which spoke through Castelli. As one could expect, the awakening of Galileo's Copernican conscience following Castelli's letter is presented as accompanied by an appropriate sense of guilt:

> He had been attacked by enemies and challenged by rivals. It was Benedetto Castelli, however, his devoted student and disciple, who unintentionally delivered the unkindest cut of all, by pointing out that in his pursuit of celestial novelties to dazzle the Grand Duke, Galileo had neglected a phenomenon of supreme importance ....[175]

Westfall's reconstruction of this phase of Galileo's career is structured by a fall-and-redemption narrative. But the plot typical of the 'morality play' genre forces him to make unwarranted judgements. For instance, how can one know that Galileo perceived Castelli's letter as "the unkindest cut of all"? As far as I can tell, such a statement is not supported by empirical evidence. I think that Westfall's belief in the call-deviation-guilt-and-redemption narrative causes him to 'perceive' mental states of Galileo's to which nobody had (nor can have) access.

Galileo's sense of (Copernican) guilt is not the only construct introduced by the narrative structure of Westfall's interpretation. His claim that Galileo had neglected the Copernican meaning of the phases of Venus has an equally non-empirical status. Such a claim is based on the assumption of the presence in Galileo's mind of a perfectly structured Copernican *gestalt* produced by his deep commitment to the Copernican system — the Copernican conscience — which would make him perceive the importance of the phases of Venus as a sort of moral imperative. Also, Westfall needs to assume the presence of some 'clouding' factor, of some idol of the marketplace (the distractions of patronage) which allegedly prevented Galileo from perceiving the Copernican significance of that phenomenon or even forced him to repress it. All these *ad hoc* assumptions are the result of Westfall's attempt to save a substantialistic or idealistic notion of science as separate from social factors such as patronage.

Although it is perfectly true that Galileo defended the reality of his discoveries very energetically, their Copernican significance did not immediately become the central issue of the debate. In general, the first attacks on the *Sidereus nuncius* focused on the very existence of those things Galileo claimed to have observed. The reliability of the telescope, rather than the validity of the Copernican system, was the target of Galileo's adversaries and the subject of his replies in the period immediately following the publication of the *Sidereus nuncius*.[176]

Also, Galileo's correspondence of that period indicates that the primary goal of his defence was to prevent Cosimo II from developing doubts about the reality of the planets Galileo had named after his dynasty.[177] With all the copies of the *Sidereus nuncius* proudly distributed by the Medici at the major European courts, an international scandal would have broken out if the planets turned out to be fictitious. For Galileo that would have been the end of *any* career, for it seems very improbable that in those circumstances he could have gone back to Padua.

Then, although the telescopic discoveries certainly contradicted the beliefs of the Aristotelian philosophers, they did not need to be *necessarily* perceived as evidence for the Copernican system. Moreover, technical astronomers could accomodate Galileo's discoveries (phases of Venus included) within the Tychonic system.[178] Nor did astronomers need to be Copernicans to receive Galileo's discoveries with enthusiasm. Such discoveries allowed technical astronomers to discredit a common professional enemy they shared with Galileo — the philosopher.[179] I think that the Jesuit *mathematicians* gave Galileo a triumph in Rome in 1611 not because he was a Copernican, but because his discoveries reinforced the cognitive claims of mathematicians over those of the philosophers — a battle for disciplinary legitimation they shared with him.

But I want to stress that I am *not* claiming that Galileo did not believe in Copernicus's theory in 1610 or that Copernicanism did not have anything to do with the way he defended his discoveries. Simply, I think that categories such as 'Copernican' and 'Copernicanism' should be problematized. It is one thing to believe in the Copernican system, another to be a 'soldier' of the 'Copernican cause'. These two things are problematically confused by those who believe in the magico-ethical compulsion inevitably associated with the intellectual recognition of the 'truth' of a theory. Judging from the letters he exchanged with Kepler in the 1590s, Galileo had a fairly clear idea of the difference between believing in a theory and being a militant supporter of it. Historians seem to focus on a letter from Galileo to Kepler in which he admits to believing in the Copernican theory for some time while they disregard the fact that the subsequent letter of Kepler's, in which he tries to involve Galileo in a sort of Copernican crusade, went unanswered.[180]

My claim is that we cannot confuse theoretical appreciation and actual commitment. Such a 'synthesis' is a category mistake resulting from the adoption of an idealistic historiographical view. Instead, I have suggested that Galileo's *commitment* to the Copernican system was the result of a long process *in which patronage played an important role.* Galileo's Copernicanism should be perceived as an *explanandum* rather than assumed as an *explanans.*

As we have seen, the most successful clients of the time were those who took up very controversial and spectacular forms of cultural production. I suggest that it was precisely the pressure put upon Galileo from a great patron to keep up with high-visibility controversial discoveries and positions that made him perceive the implications of Castelli's letter. Castelli's letter may have been crucial, but not for waking Galileo up from the stupor of patronage pleasures. On the contrary, it may have given him new means to engage in those pleasures even more deeply. Galileo's commitment to Copernicanism after 1610 can be seen also as the way a high-visibility client of a great patron had to maintain his status by keeping engaged in controversial, aggressive forms of

intellectual production. And, quite literally, there was no more difficult — and therefore honourable — challenge for Galileo than to fight for Copernicanism.

To sum up, while the categories of Kuhnian historiography are unable to fit early modern science, substantialistico-idealistic views run into tautologies and paradoxes because of the separation they introduce between the conceptual and patronage-related dimensions of early modern science. For instance, it is because of such a dichotomy that Westfall is forced to assume a Copernicanism-bound *normative* scientific ethics as a sort of internal engine and behavioural code of Galileo's scientific career. Then, the misfunctioning of this engine (the breakdown of the Copernican ethics due to patronage's devious effects) requires the *ad hoc* intervention of Copernican providence. In short, Westfall does not *explain* the relationship between Galileo's science and patronage: he *exorcizes* it.

But, as indicated above, a global analysis of the role of patronage allows us to drop the many *ad hoc* categories (the 'epicycles') introduced to defend an idealistic view of science and by the Kuhnians to defend their community-centred one. By studying how patronage shaped the *identities* of the early modern scientists, we may explain the interaction between the intellectual and social dimensions of science in greater detail and simplicity. By dropping idea-centred (or community-centred) views of science for identity-centred ones, we may skip historiographical epicycles and jump straight to ellipses.

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Abbreviations:
ASF = *Archivio di Stato di Firenze.*
GO = G. Galilei, *Opere*, ed. by A. Favaro (Florence, 1890–1909).

1. 'Primo Segretario' does not translate well into any modern political role. 'Prime Minister' may be its least distorting analogue. Belisario Vinta obtained that post in December 1609.
2. *GO*, x, no. 307, 353.
3. The pervasive sense of anarchy conveyed by these views of early modern science is a stereotype. Dominant discourses tend to depict their 'other' as irrational and unpredictable. The alleged anarchy perceived at the origins of paradigmatic science is no exception. Moreover, the inability of an hegemonic discourse to apply its categories to the 'other' is

not taken as a sign of its own inadequacy but rather as a confirmation of its 'truth' for it 'proves' the utter chaotic nature of the 'other'. Historians defeated (or only partially succesful) in trying to find Kuhnian communities and institutions in early modern science are like missionaries killed by the natives they are trying to 'civilize' so that somebody (in the 'civilized' world) can keep claiming that natives are murderous and uncivilizable savages.

4. See, for instance: U. Baldini, "Christoph Clavius and the scientific scene in Rome", in G. V. Coyne, M. A. Hoskin and O. Pedersen (eds), *Gregorian reform of the calendar* (Vatican City, 1983), 137–69; *idem*, "La nova del 1604 e i matematici e filosofi del Collegio Romano", *Annali dell'Istituto e Museo di Storia della Scienza di Firenze*, vi (1981), 63–98; *idem*, "L'astronomia del Cardinale Bellarmino", in P. Galluzzi (ed.), *Novita celesti e crisi del sapere* (Florence, 1984), 293–305; *idem*, "Galileo, la nuova astronomia e la critica dell'aristotelismo nel dialogo epistolare tra Giuseppe Biancani e i revisori romani della Compagnia di Gesu", *Annali dell' Istituto e Museo di Storia della Scienza di Firenze*, ix (1984), 13–43, G. Cosentino, "Le matematiche nella *Ratio Studiorum* della Compagnia di Gesu", *Miscellanea storica ligure*, ii (1970), 171–213; *idem*, "L'insegnamento delle matematiche nei collegi gesuitici nell'Italia settentrionale", *Physis*, xiii (1971), 205–17; E. Knobloch, "Sur la vie et l'œuvre de Christophore Clavius", *Revue d'histoire des sciences*, xli (1988), 331–56; G. Baroncini, "L'insegnamento della filosofia naturale nei collegi italiani dei Gesuiti", in G. P. Brizzi (ed.), *La Ratio Studiorum* (Rome, 1981), 163–215; A. C. Crombie, "Mathematics and Platonism in the sixteenth-century Italian universities and in Jesuit educational policy", in Y. Maeyama and W. G. Saltzer (eds), *Prismata* (Wiesbaden, 1977), 63–94; P. Dear, "Jesuit mathematical science and the reconstitution of experience in the early seventeenth century", *Studies in history and philosophy of science*, xviii (1987), 133–75; J. H. Heilbron, *Elements of modern physics* (Berkeley, 1982), 93–106; and W. A. Wallace, *Galileo and his sources* (Princeton, 1984). C. Schmitt's extensive work on science and philosophy in the Italian sixteenth century universities and V. E. Thoren, "Tycho Brahe as the dean of a Renaissance research institute", in P. L. Farber and M. J. Osler (eds), *Religion, science, and worldview* (Cambridge, 1985), 275–95, are also expressions of this type of institution-based historiography.
5. R. Westfall, "Science and patronage: Galileo and the telescope", *Isis*, lxxvi (1985), 11–30, and S. Drake, *Galileo at work* (Chicago, 1978) are examples of this type of historiography, which finds its distant roots in the works of Koyré and Burtt. This tradition runs into a curious methodological paradox. Its members tend to participate in Molière's sarcasm for the Aristotelian thinking of the medical student in the *Le malade imaginaire*. In his personalized Latin, Bachelierus tells his professor that opium puts patients to sleep precisely because of its inherent sedative quality — a "virtus dormitiva cuius est natura sensus assoupire" (Molière, *Le malade imaginaire*, ed. by A. Bouvet (Paris, 1963), 130). The belief in the existence of the 'scientific mind' or 'scientific attitude' whose natural tendency is to produce 'science' is not different from Molière's young physician's belief in opium's *virtus dormitiva*. It is an interesting paradox that the 'substantialistic' view of scientific rationality as held by this historiographical tradition turns out to be in patent contradiction to the notion of scientific rationality it claims to defend. Like Molière's Bachelierus, they transform the *explanandum* into the *explanans*.
6. Such a notion of patronage could be more than a pre-modern version of the social system of science for it could be also used to uncover the non-modern dimensions of the modern social system of science and criticize the dogmas of the institution-based historiography of modern science. For example, Dorinda Outram, *Georges Cuvier* (Manchester, 1984), views scientific institutions as frames within which networks of patronage were developed, suggesting a continuity between the social systems of early modern and modern science.

7. B. Cellini, *La vita* (Turin, 1973); G. Marino, *Lettere* (Turin, 1966).
8. Cicero, *De re publica*, ii.16, quoted in R. Weissman, "Taking patronage seriously", in F. W. Kent, P. Simons and J. C. Eade (eds), *Patronage, art, and society in Renaissance Italy* (Oxford, 1987), 25–45, p. 33.
9. See Weissman, *ibid.*, especially pp. 27–30.
10. Examples of works in the history of Renaissance Florence that have treated patronage as a complex social institution are R. Trexler, *Public life in Renaissance Florence* (New York, 1980); F. W. Kent, *Household and lineage in Renaissance Florence* (Princeton, 1977); R. Weissman, *Ritual brotherhood in Renaissance Florence* (New York, 1982). Relevant essays on patronage in early modern Italy are found in Kent, Simons and Eade (eds), *Patronage, art, and society in Renaissance Italy*. More traditional views on patronage in Renaissance Europe are found in G. F. Lytle and S. Orgel (eds), *Patronage in the Renaissance* (Princeton, 1981). Patronage as a form of social organization in the Mediterranean basin is studied in J. Pitt-Rivers, *Mediterranean countrymen* (Paris, 1963) and E. Gellner and J. Waterbury, *Patrons and clients* (London, 1977). For socio-anthropological views of patronage see J. Boissevain, *Friends of friends* (Oxford, 1974); S. N. Eisenstadt and L. Roniger, *Patrons, clients, and friends* (Cambridge, 1984); and S. W. Schmidt, L. Guasti, C. H. Lande and J. C. Scott, *Friends, followers, and factions* (Berkeley, 1977).
11. Westfall, "Science and patronage" (ref. 5), 29.
12. The enrolling of noble practitioners in order to legitimize a new discipline was a conscious strategy adopted by Cesi for his Lincei, *GO*, xi, no. 874, 507. On the relationship between social and cognitive status of mathematics and mathematicians in Italy before Galileo, see M. Biagioli, "The social status of Italian mathematicians, 1450–1600", *History of science*, xxvii (1989), 41–95. For the relationship between disciplinary status and legitimacy of cognitive claims, see R. S. Westman in "The astronomer's role in the sixteenth-century: A preliminary study", *History of science*, xviii (1981), 105–47. The relationship between social status and cognitive legitimacy indicates the sociological importance of authors like Guidobaldo, Tycho, or Boyle. Through their undisputed aristocratic status as well as through their scientific achievements they legitimized the new science. The Jesuits' Collegio Romano played a similar role. Although the members of the Society of Jesus did not necessarily come from the aristocracy nor were they necessarily brilliant mathematicians, their order brought them a degree of nobility. They shared the 'sacredness' of the Church in the same way ambassadors participated in the sacredness of the state they represented.
13. P. Dear, "*Totius in verba*: Rhetoric and authority in the early Royal Society", *Isis*, lxxvi (1985), 145–61, p. 156.
14. Simon Schaffer and Steven Shapin, *Leviathan and the air pump* (Princeton, 1985), especially 58–59, 66. The relationship between social status and credibility is also the underlying theme of Shapin's "The house of experiment in seventeenth-century England", *Isis*, lxxix (1988), 373–404.
15. Peter Burke, "Classifying the people: The census as collective representation", *The historical anthropology of early modern Italy* (Cambridge, 1987), 27–39, p. 29.
16. This notion of power is broadly derived from Foucault's analysis of the structure of power mechanisms. For a concise statement of his views, see M. Foucault, "Truth and power", *Power/Knowledge* (New York, 1980), 109–33.
17. *GO*, x, no. 131, 153–4.
18. I am thinking of an interpretation of the role of brokers as mediators between hierarchically organized social castes along the lines of Mary Douglas's anthropological analysis of the threat of pollution related to the maintenance of social boundaries. See her *Purity and danger* (London, 1966). In a sense, early modern brokers were 'pollution controllers'.

This interpretation of the role of brokers seems to be confirmed by Galileo's rhetoric in a letter to Cosimo in 1605 presented in ref. 26 below.

19. *GO*, x, no. 120, 144; no. 138, 160; no. 190, 210–13; and no. 192, 214–15.
20. *GO*, x, no. 232, 254–5; no. 320, 361; no. 349, 388; no. 378, 420–1; no. 385, 385–6; no. 309, 354; and xi, no. 831, 463–4.
21. *GO*, x, no. 126, 148.
22. *Ibid.*, no. 97, 106–7; no. 99, 109; no. 131, 154–5; no. 190, 210–13; no. 209, 231–4; and no. 211, 235.
23. Patronage connections were a family capital transmitted to its male members as we can see from the father/son or uncle/nephew pairs who appear as patrons and brokers of Galileo (Saracinelli, Giugni, Piccolomini). Galileo too developed his 'patronage clan' connected to the Medici court by placing members of his family in the Medici administration, and by having his son legitimized, given a sinecure by Urban VIII, and later married to the daughter of Geri Bocchineri — a member of a family quickly emerging through the ranks of the Medici bureaucracy. Therefore, although there is no continuity between Galileo, his father, his son Vincenzio, and his brother Michelangelo in terms of their specific activity, we find a strong continuity in terms of their social role: they were all courtiers and civil servants. Moreover, Galileo's responsibility for the dowries of his sisters suggests that he was never an 'individual' but the head of a clan. His role as the head of an impoverished clan probably explains why he did not marry Marina Gamba although he had three children by her, and that he later locked up the two daughters in a convent. In the early 1610s he was no longer poor but not rich enough to marry the two daughters to people of social status comparable to the one he had recently acquired. Although these are well-known facts, it may be interesting to put them together and view Galileo not just as a mathematician who dedicated his discoveries to the Medici and made a brilliant career at their court, but also as the head of a Florentine clan with some connections with the court who tried to maximize his patronage assets not only for his sake but also for that of his clan. The early phases of Galileo's family-related strategies can be traced in *GO*, x, no. 65, 74; no. 163, 180–1; no. 202, 225; no. 206, 227–8; no. 290, 312–14; xi, no. 497, 71; and no. 522, 95–97.
24. *GO*, x, no. 73, 84 (emphasis mine).
25. *Ibid.*, no. 120, 144; no. 126, 148; no. 129, 150–1; no. 133, 155–6; no. 134, 156–7; no. 136, 158–9; and no. 138, 160.
26. *Ibid.*, no. 208, 230–1. Apparently he planned it for some time and consulted with his brokers just before he wrote to Cosimo. Saracinelli wrote to him: "Ho quasi voglia di aggiunger V. S. per un essempio in quell'opuscolo che fa Plutarco *De vitiosa verecundia*, poi chè la dice *di non haver havuto ardire di scrivere al Ser.mo Sig. Principe ...*", *ibid.*, no. 129, 151.
27. Galileo's correspondence indicates that he used also the services of a number of broker-like individuals (like Sertini in Florence or Cigoli and Faber in Rome) who might be called 'informers'. These were not occasional brokers for they did not handle privileges but information. They seem to have had a specific sociological character. Neither Sertini nor Cigoli were powerful, but they had access to the powerful. They could see and hear without being able to manipulate. But they were important in giving Galileo information he could not have received from more powerful patrons or brokers who did not have or could not display the perspective of the marginal. Cigoli's information must have been very important if, after Cigoli's death, Galileo sent Guiducci as his 'spy' to Rome during the crisis over the comets although he had plenty of powerful patrons and brokers there. Faber seemed to have played the same role for Welser in Rome.
28. As I indicate in "Galileo the emblem-maker" forthcoming in *Isis*, lxxxi (1990), it was on this occasion that Galileo tried out strategies of patronage based on the representation of scientific artifacts in terms of the discourse of the court, strategies that he would best

articulate in 1610 with the framing of his astronomical discoveries within the myths of the Medici dynasty.

29. *GO*, x, no. 129, 150–1; no. 133, 155–6; no. 136, 158–9; no. 143, 161–2; no. 164, 181; no. 223, 246–7; no. 240, 258–9; and no. 281, 305.
30. *Ibid.*, no. 277, 301.
31. Statements of this type kept patronage channels open from both sides in the hope that they might be used for mutual advantage, because, in contrast to an employer–employee relationship, patronage ties were not usually active all the time.
32. *Ibid.*, no. 23, 39; and no. 208, 230–1.
33. *Ibid.*, no. 90, 101–2.
34. *Ibid.*, no. 91, 102.
35. *Ibid.*, no. 62, 72–3.
36. *GO*, xiii, no. 1685, 231.
37. *GO*, x, no. 146, 164–6; and no. 131, 153–4.
38. *Ibid.*, no. 146, 165.
39. *Ibid.*, no. 209, 231–4.
40. *Ibid.*, no. 307, 348–53.
41. R. Trexler, *Public life in Renaissance Florence* (New York, 1980), 135.
42. *GO*, x, no. 10, 25. Guidobaldo expressed similar feelings also in no. 27, 41: "Con effetto V. S. non vuol lasciare complimento nessuno con me: ma credo che già ella habbi compreso la natura mia, lontana da ogni cerimonia ...."
43. *Ibid.*, no. 10, 26.
44. *Ibid.*, no. 246, 261.
45. *Ibid.*, no. 46, 54.
46. *Ibid.*, no. 133, 155–6: "Il Sig. mio zio [Cipriano] è di natura molto sincera, e con gli amici suoi (nel numero dei quali son certo che tien V.S.) procede con semplicità et schiettezza et senza alcuna sorte di cerimonia, come presuppongo che non l'usasse con V.S. quando rispose alla gentilissima lettera che aveva ricevuta da lei; onde, havendo S.S.ria veduto quello ch'ella scrive a me, si è meravigliato che V.S. pensi che la lettera di lui habbia bisogno di ringraziamenti ...." However, Galileo seemed to use more ceremonies later on, *ibid.*, no. 155, 178.
47. *Ibid.*, no. 229, 251 (emphasis mine).
48. Biagioli, "Galileo the emblem-maker" (ref. 28).
49. *GO*, x, no. 146, 165; no. 209, 233; and no. 307, 351.
50. *Ibid.*, no. 209, 233.
51. R. S. Westman, "The astronomer's role in the sixteenth century: A preliminary study", *History of science*, xviii (1980), 105–47; Biagioli, "The social status of Italian mathematicians, 1450–1600" (ref. 12); M. Biagioli, "The anthropology of incommensurability", forthcoming in *Studies in history and philosophy of science*, xxi (1990).
52. We find only four requests of patronage for three clients before 1610 (*GO*, x, nos. 98, 100, 179, 229), and eleven requests for nine clients between 1610 and 1612 (*ibid.*, nos. 386, 441, 444, 445, 448; xi, nos. 469, 473, 474, 488, 577, 726).
53. U. Barberi, *I Marchesi Bourbon del Monte Santa Maria di Petrella e di Sorbello* (Città di Castello, 1943), 64–65.
54. Guidobaldo began to press his brother for a position for Galileo in May 1588. Guidobaldo's targets were the chair at Pisa and the public lectureship in Florence, which had once been Danti's (*GO*, x, no. 17, 33–34; no. 18, 34–35; no. 20, 36–37; and no. 21, 37–38). In July 1588 Galileo wrote to Guidobaldo saying that the chair at Pisa was already filled and that the only possibility still open was the public lectureship in Florence connected with the Accademia del Disegno (*ibid.*, no. 19, 36). As it turned out, Galileo got the chair at

Pisa — the one he thought was already filled. That happened in 1589, a few months after the election of Francesco Maria to the cardinalate.

55. Although there are probably gaps in the correspondence, we do not have letters from Guidobaldo after 1597 and the last letter from Galileo dates from December 1602.
56. *GO*, xi, no. 569, 170–2.
57. See ref. 130 below.
58. Galileo's shift from Florence to Rome as the locus of his patronage networks can be associated with his need to maintain a relationship with a very strong patron. Only with such arrangements could he maintain and increase his status and legitimation. And Cosimo II — a grey, frequently sick, and almost always debilitated prince — was not a real presence. Moreover, after his death in 1621, Galileo found himself as a court philosopher and mathematician with a very good salary but without a flesh-and-blood patron. Cosimo's son Ferdinando turned eighteen (and became Grand Duke) in 1628. By then, Galileo's strategies had long been focused on Rome.
59. N. Arrighetti, *Delle lodi del Sig. Filippo Salviati* (Florence, 1614), 43.
60. The printing of the *Assayer* began in May 1623, Maffeo Barberini was elected Pope Urban VIII on 6 August, and the *Assayer* was dedicated to him as it came from the press in October. Before Urbano's election, Ciampoli was the *Secretario Apostolico* (or *Secretario dei Brevi*), while Cesarini was the pope's *Cameriere Secreto*.
61. "Io raggiro nella mente cose di qualche momento per la repubblica litteraria, le quali se non si effettuano in questa mirabil congiuntura, non occorre, almeno per quello che mi aspetta per la parte mia, sperar d'incontrarne mai più una simile", Galileo to Cesi, 9 October 1623, *GO*, xiii, no. 1581, 135. Cesi agreed with Galileo that the scenario was indeed a "congiuntura sì buona", *ibid.*, no. 1588, 140. The best treatment I know of this period is in P. Redondi, "Mirabile congiuntura", *Galileo eretico* (Turin, 1983), 85–134.
62. After the election of Urbano, Cesarini became his *Maestro di Camera*, while Ciampoli added to his title of *Secretario dei Brevi* that of *Cameriere Secreto, GO*, iii, no. 1564, 121.
63. "altri pur s'incammini in verso Roma/ a veder nel gran seggio il nuovo Urbano/ carico della grave e ricca soma/ e faccia prova ancor se con la mano/ afferrar puo lo sventolante ciuffo/ di lei che fugge, e poi s'attende invano./", J. Soldani, "Contro i Peripatetici", reprinted in N. Vaccalluzzo, *Galileo Galilei nella poesia del suo secolo* (Milan, 1910), 20.
64. B. Baldi, "Vita Federici Commandini", in *Giornale de' letterati d'Italia*, xix (1707), 140–85; P. L. Rose, *The Italian renaissance of mathematics* (Geneva, 1975), 185–221; C. Bianca, "Federico Commandino", *Dizionario biografico degli Italiani* (Rome, 1982), xxvi, 602–6.
65. A. de Barros, *The courtier's philosophy* (Madrid, 1587), quoted in G. Parker, *Philip II* (London, 1978), 170. I owe this reference to Prof. William Monter of Northwestern University.
66. A. De Ferrari, "Giovanni Ciampoli", *Dizionario biografico degli Italiani* (Rome, 1981), xxv, 147–52; A. Favaro, "Giovanni Ciampoli", *Amici e corrispondenti di Galileo* (Florence, 1983), i, 132–89; G. Targioni Tozzetti, "Vita di Monsig. Giovanni Ciampoli fiorentino, Segretario de' Brevi segreti di Gregorio XV, e Urbano VIII Sommi Pontefici", *Notizie degli aggrandimenti delle scienze fisiche ...* (Bologna, 1967), ii, pt 1, 102–16. On Cesarini, see *Dizionario biografico degli Italiani, sub vocem*; and A. Favoriti, *Virginii Cesarini vita*, in *V. Cesarini carmina* (Rome, 1658), 1–30.
67. *GO*, xiii, no. 2269, 352. See also R. S. Westfall, "Patronage and the publication of Galileo's *Dialogue*", *History and technology*, iv (1987), 385–99.
68. Iacopo Soldani is listed as "Aio del Serenissimo Principe" in the *ruoli* of the Medici court from 1630, *ASF*, "Manoscritti 321", 522. His very high salary (600 scudi a year) indicates that Soldani was much more than a tutor, rather something of a "big brother" (Prince Leopold was an orphan). Soldani was made a senator in 1637 (*ASF*, "Manoscritti 320", 255) and *Maestro di Camera* (one of the highest roles at court) in 1639 (*ASF*,

"Miscellanea medicea 438", c212v.). Soldani's role in cultivating the scientific interests of the future founder of the Cimento can be found in a few letters from 1640 between Leopoldo and Soldani related to the dispute betwen Galileo and Liceti that were not included by Favaro in the Edizione Nazionale (*ASF*, "Mediceo 5550", c261, c271, c272, c274, c278, c291, c310).

69. Biagioli, "Galileo the emblem-maker" (ref. 28).
70. *ASF*, "Manoscritti 132" (Diario fiorentino del Settimanni, vii (1608–20)), c.39r.: "Addì di Luglio 1610. Sabato. Il signor Galileo Galilei avendo dedicate alla Serenissima Casa dei Medici le quattro stelle nuovamente osservate da lui aggirarsi intorno al pianeta di Giove, con aver fatto loro nome di Stelle e Pianeti Medicei, il Serenissimo Granduca in segno di gratitudine con sua propria lettera richiamollo di Padova, dov'era pubblico lettore, al suo servizio con il titolo di Primario e sopraordinario Matematico dello Studio di Pisa senza obbligo di leggervi, o risedervi, e di Primario filosofo, e matematico di S.A.S., assegnandoli un buono stipendio."
71. M. Mauss, *The gift* (New York, 1967), 31–45.
72. N. Elias, "The sociogenesis of French court society", *Court society* (New York, 1983), 146–213. The only attempt — quite different from mine — to use the model of gift-exchange in relation to the social system of science I am familiar with is W. O. Hagstrom, "Gift giving as an organizing principle in science", in B. Barnes and D. Edge (eds), *Science in context* (Cambridge, Mass., 1982), 21–34.
73. *GO*, xix, 147–58. As this article goes to press, I have received Paula Findlen's "Gift giving and the symbolics of exchange in early modern Italy", and "The sociology of the scientific enterprise", two chapters of her Ph.D. dissertation, "Museums, collecting, and scientific culture in early modern Italy", University of California, Berkeley, 1989. Her remarkable analysis of patronage brokerage, and gift-exchange among Italian collectors of natural history is very pertinent to the type of analysis I have presented here.
74. *GO*, x, no. 45, 54.
75. *Ibid.*, no. 45, 54 (emphasis mine).
76. *Ibid.*, no. 33, 45 (emphasis mine).
77. M. Fantoni, "Feticci di prestigio: Il dono alla corte medicea", in S. Bertelli and G. Crifo (eds), *Rituale, cerimoniale, etichetta* (Milan, 1985), 141–61; and C. Zaccagnini, *Lo scambio dei doni nel Vicino Oriente durante i secoli XV–XVII* (Rome, 1973). The ritualistic exchange of gifts is encountered very frequently in the *Diari di etichetta* of the Medici court (*ASF*, "Diari di etichetta di guardaroba", nos. 1–7). It plays a fundamental role in the ritual of reception of foreign dignitaries. See also *ASF*, "Carte strozziane", Serie I, 30, carte 127–44, "Donativi".
78. Fantoni, "Feticci di prestigio", 143. That gold chains represented a sort of transitional stage of the gift toward a more quantified and cash-like retribution is shown by the various examples listed by Fantoni, but also by the specifically stated value of the two gold chains Galileo received from the Gonzaga and the Medici, by the references found in Galileo's correspondence about court clients being given gold chains and medals (*GO*, xi, no. 838, 473), and by the gold chain given by the Medici to Acquapendente on the occasion of his visit to Florence.
79. *GO*, x, no. 75, 86; no. 82, 90; and no. 87, 96. *Ibid.*, no. 85, 95. *Ibid.*, no. 187, 208. *Ibid.*, no. 89, 100. For more gift exchanges between Galileo and Sagredo see *GO*, xii, no. 1188, 246; no. 1198, 258; no. 1219, 273; no. 1224, 278; no. 1230, 286; no. 1255, 317; no. 1275, 343–4; no. 1281, 349; no. 1287, 355; no. 1310, 376; and no. 1341, 407.
80. For instance, Trexler, *Public life in Renaissance Florence* (ref. 41), 131–59, and Westfall, "Science and patronage" (ref. 5).
81. *GO*, x, no. 82, 91 (in this and the following quotations, the emphases are mine).
82. *Ibid.*, no. 101, 110–11.

83. *Ibid.*, no. 238, 257.
84. *Ibid.*, no. 320, 361.
85. *GO*, xiii, no. 1526, 91. See also no. 1527, 92.
86. *GO*, x, no. 371, 411.
87. *Ibid.*, no. 68, 77–78.
88. "... se piacer a Dio et alla V.S. che egli, secondo il suo desiderio, passi il resto della vita sua al servizio di V.S.", *ibid.*, no, 228, 77–78.
89. *GO*, xi, no. 813, 447.
90. *Ibid.*, no. 569, 172. When, more than a year later, Venier resumed his connection with Galileo, he wrote that Galileo's departure offended many people in Venice and Padua who thought that he should have acknowledged the unusual gift given him by accepting it or by "some other gesture" and that "those in power — who are very wise — do not talk about the matter [Galileo's departure] as if it were some insignificant event that happened in some remote country", *ibid.*, no. 591, 215–16. Galileo's insult made him taboo to the Venetian Senate. In another letter from 1613 we find that although Galileo was "honorato di così grandi augmenti, et in un istante ha fatto affronti a quel Studio: onde in particulare il Prioli non vuole udire ne anco il suo nome", *ibid.*, no. 871, 504.
91. *GO*, x, no. 277, 298.
92. *Ibid.*, no. 277, 299.
93. *Ibid.*, no. 142, 161, and no. 295, 318. When Galileo was in Florence during the summer to teach mathematics to Prince Cosimo he was not paid but hosted at court. When the Medici Maggiordomo, Giovanni Del Maestro, invited Galileo to the Villa di Pratolino — one of the court's summer residences — in August 1605, he told him that Cristina offered him "buona camera, modesta tavola, buon letto e grata cera", but he did not mention any monetary reward (*ibid.*, no. 122, 146). That the Medici thought of hospitality as a gift — and therefore as a reward for Galileo's services — is confirmed by the fact that they would send him gifts of food when he was not staying at court. For instance, when in July 1605 the court was still in Florence and Galileo was staying at his brother-in-law's, Cristina had Giovanni del Maestro send "Al Signor Dottore Galilei in casa di Ms. Benedetto Landucci suo cogniato ... 1 pezzo di vitella, 2 capponi, 6 pollastri, 4 fiaschi di vino" (*ASF*, "Carte strozziane", Serie I, 30, c134v.). On Cristina's intercession to secure Galileo's brother-in-law a job in the Medici administration see *ibid.*, no. 205, 227.
94. *ASF*, "Diari di etichetta di guardaroba 1": "1 Settembre 1604. Il Signor Giacomo Fabrizi da Acquapendente medico venuto di Padova per curare il Sig. Principe Don Carlo e spesato da noi in palazzo con 3 di sua tavola e due servitori servito da dua dì nostri staffieri. Il dì seguente si mandò a desinare al Poggio e a cena nella Villa Ferdinanda. Il dì 4 partì per ritornarsene a Padova con una nostra lettiga e dua muli da soma e 4 cavalli di vettura accompagnato e spesato da Alessandro Berghi staffiere di Madama sino in Padova regalato d' una richa collana, rascia, raso nero et altre galanterie di buona valsuta", 180. In 1614, Acquapendente is invited back to Florence with other doctors to heal Cosimo II. Their reception, treatment, and gifts are comparable to those given them in 1604 (*ASF*, "Miscellanea medicea 437", cc34–35.)
95. See Fantoni, "Feticci di prestigio" (ref. 77).
96. It seems that it is only the power to decide what gifts to accept that allows for the inversion on which the patron's power is rooted. In fact, the patron is a 'central client' (i.e., the main/central receiver of gifts) and those who are called clients are actually many 'patrons' (i.e., gift-givers). But this power structure is represented as inverted. Although the ambiguity about who is a patron and who is a client becomes clear once we trace the genealogy of a great patron's power, we find traces of it also in common language, as in the ambiguity presented in English between the clients and the patrons of a shop.

97. This scenario recalls — *mutatis mutandis* — that of a modern state running on public debt yet maintaining its sovereignity.
98. *GO*, x, no. 73, 84; and no. 119, 142–3.
99. For instance: "et alla mia venuta costa questo Giugno porterò al G.D. in questa materia cose di infinito stupore" (*ibid.*, no. 277, 302); "[during the next visit to Florence] havero meco qualche miglioramento dell'occhiale, et forse qualche altra invenzione" (*ibid.*, no. 257, 271).
100. That enigmas were forms of challenges or duels is clear enough (think for instance of the sphynx in Sophocles's *Oedipus Rex*). And, as we have seen, challenges and gifts have an analogous role in the economy of honour, status, and credibility in a number of 'primitive' and north African cultures (see Bourdieu, "The sentiment of honour in Kabyle society" (ref. 106), 215; and M. Mauss *The gift* (ref. 71). In the case of Galileo, critiques (i.e. questions) were presented as honourable gifts or challenges, and Galileo's answers were received as counter-gifts. Moreover, enigmas were literally exchanged as gifts, as in the case of Galileo's sending out ciphers representing his latest discoveries. Judging from the reaction of Welser, Kepler, Giuliano de' Medici, and Rudolph II upon receiving Galileo's enigmas, it seems that they were quite addictive gifts, *GO*, xi, nos. 451, 454, 455, 462, 471.
101. *GO*, x, no. 8, 22–23. On Cosimo Concini, see P. Malanima, "Concini, Cosimo", *Dizionario biografico degli Italiani*, xxvii.
102. *GO*, x, no. 9, 24–25.
103. Why would Clavius choose to be so nice with Galileo? Here is a tentative interpretation of the 'microphysics of patronage' involved in the exchange: Concini is a fairly important Church official. Now, if Concini gets 'impressed' by the fact that Galileo is a friend of Clavius's, it means that he acknowledges Clavius's high status. And Concini's very act of recognizing Clavius's high status confirms it (in Concini's eyes). This, I think, is Clavius's 'gain' in the symbolic exchange. But Concini gets his share too. In fact, his own status is confirmed (or even improved) by the fact that a high-status person like Clavius explicitly acknowledges his friendship for one of Concini's clients (i.e., one who has less status than Concini). At the end of this symbolic exchange Galileo's status is at least confirmed in relation to Clavius and certainly improved in relation to Concini. This 'gain' by Galileo has to do with the content of his letter to Clavius. Beside the technical content (it is on a theorem on the centre of gravity of bodies obtained from the rotation of conic sections), Galileo refers to Clavius as a judge to whose decision he submits himself voluntarily. This act of voluntary submission is a gift, and Clavius reciprocated it by helping Galileo's image with Concini.
104. Around this time Tycho was looking for somebody to write his own celebrative biography probably to be used to increase his standing with Rudolph II (Drake, *Galileo at work* (ref. 5), 50). This may have been one of the reasons for Tycho to follow up on Concini's suggestion and seek Galileo's friendship.
105. *GO*, x, no. 70, 79.
106. P. Bourdieu, "The sentiment of honour in Kabyle society", in J. G. Peristiany (ed.), *Honour and shame* (Chicago, 1966), 191–241; P. Bourdieu, *Outline of a theory of practice* (Cambridge, 1977), 1–29. I think that Clifford Geertz's analysis of the social significance of cockfights in Bali indicates that betting is a form of duel (in which the cock, rather than a person, gets killed) which is routinely needed to maintain the status pattern of the community. What is relevant to my point is Geertz's claim that it is not really important to win (also because bets are usually almost 1:1) but to show publicly that one bets, that one "accepts the challenge" (i.e. that one defines himself as "challengeable") (C. Geertz, "Deep play: Notes on the Balinese cock-fight", *The interpretation of cultures* (New York, 1973), 412–53).

107. *GO*, x, no. 89, 101. Actually, the Venetian Secretary managed to deliver Sagredo's letter to Gilbert, although it is impossible to know whether Galileo contributed to it. In February 1603 Gilbert wrote to his friend Barlow that "There is heere a wise-learned man, a Secretary of Venice, he came sent by that State, and was honourably received by her Majesty, he brought me a lattin letter from a Gentleman of Venice that is very learned, whose name is Johannes Franciscus Sagredus; he is a great magneticall man, and writeth that hee has conferred with divers learned men of Venice, and with the Readers of Padua", quoted in A. Favaro, "Giovanfrancesco Sagredo e Guglielmo Gilbert", in "Adversaria galileiana", serie quarta, *Atti e memorie della R. Accademia di Scienze Lettere ed Arti in Padova*, nuova serie, xxxv (1918–19), 12–15. Similar information is presented in E. Zilsel, "Origins of Gilbert's scientific method", in P. P. Wiener and A. Noland (eds), *Roots of scientific thought* (New York, 1957), 219–50, p. 247, note 36.
108. *GO*, x, no. 296, 318–19 for Kepler's receipt of the *Sidereus nuncius* from the Medici ambassador in Prague, Giuliano de' Medici. For Zugmann's receipt of a copy from his patron, the Elector of Koln, see *ibid.*, no. 303, 344–6.
109. E. Rosen (ed.), *Kepler's Conversation with Galileo's Sidereal Messenger* (New York and London, 1965), 3–4. The *Conversation* was originally sent to Galileo as a letter (*GO*, x, 319–40) and published as a book in Prague in 1610. It is interesting that at that time Galileo — although an official client of the Medici — was not yet in their service, as Kepler instead claims. Probably, it was better for Kepler's own status to act as if he was answering a 'colleague' of his, that is, the mathematician of a major prince. But — formally speaking — Kepler had some good excuse. Galileo was both an official client of the Medici through his dedication of Jupiter's satellites to Cosimo, and he had been Cosimo's tutor for several summers.
110. *Ibid.*, 4.
111. *GO*, x, no. 307, 349. Vinta too referred to Kepler not by name but as "Matematico del'Imperatore" when he discussed with Galileo the necessity of his trip to Rome early in 1611 to obtain the final legitimation of his discoveries. Vinta realized that it was not so much Kepler's personal expertise but rather his title to give him (and the Medicean Stars) credibility (*GO*, xi, no. 464, 28). Similarly, Vinta did not seem to think that the Jesuits' and the Pope's legitimation of Galileo's discoveries was important to quench the rumours of heretic implications of Galileo's discoveries. On this occasion, Vinta perceived the Jesuits and the Pope as authorities, but not necessarily as religious ones. Simply, the Pope was the most important patron and the Jesuits were his 'Keplers'.
112. *GO*, x, no. 277, 298–9, 301; and no. 284, 308.
113. N. Jardine, *The birth of history and philosophy of science* (Cambridge, 1984); E. Rosen, *Three imperial mathematicians* (New York, 1986).
114. In January 1600, Tycho wrote to Kepler that Ursus "... is not ashamed to attack with his furious and scurrilous pen my country, my family and my most honoured home with the most impudent and evil lies, as far as he can to dishonour them ...", quoted in Jardine, *op. cit.*, 22. References to Tycho's perception of Ursus's doings as insulting not just for his "scientific credibility", but for his country and family as well are found in Rosen, *Three imperial mathematicians* (ref. 113), 229, 300–1.
115. In Galileo's correspondence *honore* is systematically used to designate both what we may call 'scientific credibility' and 'honour', indicating that the socio-professional identity of the 'scientist' had not developed/speciated yet. For instance, Guidobaldo wrote to Galileo in 1588 that "Ho anche con grandissima mia satisfattione sentito che ella vogli mandar fuori le sue cose del centro della gravezza, *che in verita V.S. ne acquistera molto honore*" (*GO*, x, no. 23, 9). References to *honore* (sometimes used interchangeably with *fama*) became quite frequent during Galileo's dispute against Capra (*ibid.*, no. 154, 172; no. 156, 174; no. 160, 177–8; and no. 162, 179). As we will see below at ref. 118, 'honour' played

an important part also in the disputes of 1611 on the irregularity of the lunar surface and on the sunspots.

116. Kepler wrote to Maestlin about the Tycho–Ursus dispute saying that "... it did not seem worthy of Tycho's stature to be so violently upset by this disparagement", Jardine, *op. cit.* (ref. 113), 19. Tycho does not agree with Kepler: "Nor it is true that I feel more strongly about this silly man than my status allows ...", *ibid.*, 23.
117. *Ibid.*, 23, note 47.
118. Biagioli, "The social status of Italian mathematicians" (ref. 12), 55.
119. *Ibid.*, 64.
120. The Lincei and the other Roman supporters of Galileo pressed him to answer the various challenges ranging from the questions on the irregularities of the lunar surface, to the discovery of the sunspots, and to the calculation of the period of the Medicean Stars. They also urged him to print his response in fear that his priority would be otherwise questioned, *GO*, xi, no. 572, 175; no. 573, 176; no. 587, 212; and no. 788, 419. But Galileo's supporters were not just concerned with priority. Their statements suggest that they were concerned with Galileo's 'honour' — something he could maintain only by keeping up with an aggressive and challenging behaviour. He had to publish because his patrons and supporters were expecting him to pursue his intellectual adversaries. In September 1661 Cesi wrote to Galileo that: "Questi altri signori studiosi sono con la solita divotione verso di lei, et aspettando le sue opere con grandissimo desiderio" (*ibid.*, no. 584, 210–11). Santini sent a similar message in December 1611: "Havrò pero caro sentire da lei ciò che vada fabricando a benfitio della repubblica litteraria" (*ibid.*, no. 631, 252). In October 1612 Cigoli, while waiting for Galileo's third letter on the sunspots, told him that: "Imperò se non ha risposto, risolvete presto perche tutti i vostri amici giudicano che sia bene che quanto prima le vadino fuori .... Ora sollecitate, e mandate al Sig. Marchese quello [che] volete, acciò le possa dare a' rivenditori" (*ibid.*, no. 786, 418). A month later, Cesi wrote to Galileo that: "Solleciti dunque, che non mi par bene lasciar ch' Apelle pigli più campo; et son sicuro non dorme hora, vedendo la sua seconda lettera" (*ibid.*, no. 790, 422–3). Then, when Galileo seemed to opt for a more moderate course, his Roman patrons seemed disappointed. Cesi told him that: "Non s'è fatt'altro senza che V.S. non ne gusti: e veramente non possiamo approvare affatto il tacere; pure V.S. giudichi e comandi" (*ibid.*, no. 852, 487). But while the Linceans and Cigoli pressed Galileo into keeping an honourable, that is, aggressive and challenging course, they did not want him to answer his challengers indiscriminately. Those who did not have enough honour should have been dismissed or answered by somebody else. Cigoli told Galileo that the critiques of his work on buoyancy "erano cose da far rispondere a qualche giovane, o al meno sotto tal nome ..." (*ibid.*, no. 778, 410). Cesi shared Cigoli's view: "... a' quali [avversari] sempre e stato mio pensiero V.S. non risponda, ma si facci rispondere da giovani, per mortificarli: e quelli che faranno le risposte possono essere in parte, e anco in tutto, aiutati et anco fatti adottare l'opre compite" (*ibid.*, no. 777, 409). Therefore, Guiducci's role in the dispute on comets or Castelli's reply to Galileo's critics on buoyancy were examples of the ritual exchanges dictated by the honour-bound logic of patronage.

The intense discussion among the Lincei about whose honour had been insulted by Grassi/Sarsi, on the status of the person who should respond to Grassi, to whom Galileo may send his counter-attack, in what form such a response should be written, shows that the dispute on the comets was a scientific duel rather than what we call a scientific debate and that the Lincei were trying to respond according to the appropriate *etiquette*.

Moreover, the attacks on Galileo were ritualistic too. Cigoli understood that Galileo's views on buoyancy had been attacked also because of his high status: "... codesti uccellacci [Delle Colombe] si voglioni far luogo non per valor proprio ma per elezione del

rivale", *GO*, xi, no. 573, 176. Cigoli's view fits with the Renaissance and baroque views on duels. Carbone claimed that "... the more insolent are the young; because ... young men seek glory by violating others' honour" (L. Carbone, *De pacificatione et dicectione inimicorum* ... (Florence, 1583), quoted in F. Bryson, *The point of honor in sixteenth-century Italy* (Chicago, 1935), 29). Similarly, Mora in *Il cavaliere* stated that "... everybody seeks distinction, one mark of which is to offend fearlessly" (quoted in Bryson, *op. cit.*, 28).

The structural analogy between scientific disputes and duels (or rather courtly jousts) in this period is confirmed by the Anonymous Academician — one of Galileo's adversaries during the dispute on buoyancy. In his *Considerazioni* in response to Galileo's *Discorso*, the Academician viewed the dispute as a pleasant tournament ("non si rifiuta per diporto piacevole di venire una volta a duello con lui...") and presented his critique of the logical structure of Galileo's argument as a *mentita loicale*, where *mentita* (to give the lie) was the customary term one used to deny his adversary's charges and challenge him to a duel, *GO*, iv, 171; S. Maffei, *Della scienza cavalleresca* (Rome, 1714), 58–70.

121. Bourdieu, "The sentiment of honour in Kabyle Society" (ref. 106), 206.

122. Geertz's analysis of the social significance of the Balinese cockfight is again relevant here. He detects two structures of betting around the fight. One is much less legitimate and deals with small amounts of money bet at fairly high odds. People bet this way trying to make money. But the much more conspicuous and legitimate betting is not done for money. High-ranking members of the community bet this way as if to perform a civic ritual which confirms their status. By the fact that the odds in this kind of betting are basically 1:1, it does not really matter whether one wins or loses for, in the long run, wins and losses will even out.

123. The transition from bloody duels and spectacles (typical of ancient and medieval-feudal aesthetics) to controlled games in which the process (the 'sport') is more important than the ending is a crucial aspect of the development of court culture and modernity. Historians and sociologists who study the development of modern manners and etiquette as part of the 'civilizing process' have focused on it. Norbert Elias's work is an exemplar of this orientation. In particular, his study of the sociogenesis of foxhunting seems particularly fitting here. The gentlemen involved in foxhunting take pleasure from the 'sport' of running after and finding the fox, not to its killing, which, in fact, is the hounds' task. Similarly, I think, a baroque patron may have felt that it was 'improper' to kill the fox, i.e., to declare one defeated. I want to stress the adjective *baroque*. In earlier periods, the patron may have had pleasure in seeing the actual 'intellectual killing' of one of the contenders. Probably, Tycho's aggressiveness reflects an older and really feudal ethics and aesthetics (N. Elias, "An essay on sport and violence", in N. Elias and E. Dunning, *Quest for excitement* (Oxford, 1986), 150–74).

124. *GO*, xi, no. 684. 304; and no. 699, 326.

125. *GO*, xiii, no. 1593, 145. The fable of sound ("favola del sono") is the story of somebody who initially believed that harmonious sound could only be produced by human voice but, while travelling, encounters an almost infinite range of harmonious sounds produced by nature in many different ways. Galileo uses this fable to soften the notion of necessary demonstration. In fact, he claims that although his explanation of the comets is true, it does not need to be the only one, for nature could have produced the same effect through a range of different causes. G. Galilei, *Il saggiatore*, in *GO*, vi, 197–372, pp. 279–81.

126. In investigating the cultural bases of the introduction of emblematics in the iconography of Renaissance paintings, Salvatore Settis points to the fact that emblematics were a perfect 'sport' for the upper and culturally sophisticated urban classes. Emblems were a form of 'intellectual challenge' that was interesting *per se*. He quotes Giovanni Aurelio Augurelli, a humanist from Rimini, who around 1500 describes a salon discussion on an emblematic

painting's meaning as: "Molti esprimono molte opinioni, nessuno si trova d'accordo con l'altro: ebbene, *tutto ciò e ancor più bello delle immagini dipinte*" (emphasis mine) (Salvatore Settis, *La "Tempesta" interpretata* (Turin, 1978), 118).

127. G. Galilei, *Discourse on bodies in water*, trans. by T. Salisbury (London, 1663; reprint, Urbana, Illinois, 1960), 2–3.

128. We cannot take 'linguistic competence' in court etiquette for granted. To the contrary, the lack of such a competence was a major obstacle for lower-class mathematicians seeking to improve their socio-professional status by gaining access to the upper-courtly familia. The existence of such a problem is made explicit by Galileo himself when he writes to the Medici minister Curzio Picchena on 9 February 1607 giving him the information he requested on Minadoi, a medical professor at Padua, who is being considered to fill the position of Medici "Protomedico" left vacant after Girolamo Mercuriale's recent death. He tells Picchena that Minadoi is "di maniere et costumi piacevoli et honesti, et al parer mio *da dar satisfazione non meno nelle corti che nelle catedre*" (*GO*, x, no. 150, 168, emphasis mine). Similarly, in January 1611, Galileo writes to Vinta to recommend Papazzoni for the chair of philosophy at Pisa by saying he is "gioviale e *di graziosa conversazione*", intimating that he would be at ease at court, an environment which — as a major professor at Pisa — Papazzoni would have to frequent (*GO*, xi, no. 461, 27, emphasis mine).

Therefore, one's ability to cross the social boundary between the university and the court was not taken for granted. Galileo himself was certainly facilitated in his own 'crossing' by being the son of a musician who was well known at court and the member of a family who had some degree of nobility earlier in the Renaissance. Also, participation in salons (intermediate institutions between university and court) like Morosini's in Venice or Pinelli's in Padua (as well as the many visits to the Medici court over the summer as Cosimo's mathematical tutor) helped Galileo develop some (but not enough) familiarity with the court's proper style of argumentation and behaviour. Galileo himself admitted his having undergone such a process of socialization in a letter to Buonarroti in December 1609: "... conoscendo adesso quali sono le maniere et i termini veramente onorati della nobiltà fiorentina ..." (*GO*, x, no. 257, 271).

129. *GO*, x, nos. 185, 186, 203–4.

130. The connection between Galileo's work on comets and the patronage link with Leopold can be seen in *GO*, xii, no. 1324, 389–92; no. 1332, 397–8; no. 1369, 435; and no. 1373, 438. The result was the *Discorso delle comete* (Florence, 1619) by M. Guiducci, dedicated to Leopold and strongly inspired (or completely written) by Galileo. The Lincei's shift from a cautious attitude toward an aggressive pressuring of Galileo to respond to Grassi's *Libra* in which he had attacked the *Discorso* is evident by reading these letters in sequence: *GO*, xii, no. 1399, 465–6; no. 1406, 471; no. 1408, 472–3; no. 1409, 473–4; no. 1419, 489–90; no. 1423, 494–5; no. 1429, 498–9; xiii, no. 1433, 11; no. 1441, 20–21; no. 1446, 23; no. 1448, 24; no. 1450, 25; no. 1456, 30–31; no. 1466, 37–38; no. 1467, 38–39; no. 1474, 434; no. 1476, 46–47; no. 1477, 47; no. 1501, 68–69; no. 1512, 79; no. 1513, 79; no. 1514, 80; no. 1516, 82; no. 1518, 84; no. 1520, 86; no. 1523, 89; no. 1524, 90; no. 1536, 99; no. 1538, 100; no. 1542, 103; and no. 1543, 103.

131. *GO*, x, no. 420, 460.

132. *GO*, xx, 556–7.

133. *GO*, x, no. 424, 466.

134. *Ibid.*, no. 420, 460 (emphasis mine).

135. *Ibid.*, no. 424, 465 (emphasis mine).

136. *Tres epistolae de maculis solaribus scriptae ad Marcum Velserum* (Augsburg, 1612; reprinted *GO*, v, 23–32). Later in the same year, Apelle published a longer version, the *De maculis solaribus et stellis circa Iovem errantibus, accuratior disquisitio ad Marcum Velserum*, also reprinted *ibid.*, 35–70.

137. *GO*, xi, no. 667, 289; no. 672, 293; no. 683, 303–4; no. 741, 374; no. 771, 402–3; no. 776, 407–8; no. 794, 427–8; no. 799, 433–4; no. 806, 440; no. 817, 452; no. 832, 464–5; no. 851, 486; no. 884, 516–7; no. 938, 587–8; and no. 959, 609–10.
138. *Ibid.*, no. 637, 257.
139. *Ibid.*, no. 683, 303–4 (emphasis mine).
140. "Da Ferrara ho avuta una respostina da M. Rocco Berlinzone, il quale non vol dispute co'l mio frate, e si ascusa dicendo che esso frate si dimostra più eretico che religioso", Sagredo to Galileo, 22 April 1608, *GO*, x, no. 185, 203. According to Bryson's *The point of honor* (ref. 120), 25–26, to be heretic meant to be without honour. Also, "To call one heretic was among the heaviest insults that could be conveyed by words" (p. 37).
141. Biagioli, "The anthropology of incommensurability" (ref. 51).
142. *GO*, xi, no. 534, 118. According to Delle Colombe, Clavius seemed to share some of his own views. Delle Colombe's strategy seemed to have some chance of succeeding, for it was only six months later that it became clear that Clavius would not have entered a dispute on Delle Colombe's side (*ibid.*, no. 602, 228–9). But Delle Colombe was more successful in his strategy with the Cardinal de Joyeuse and his *Maggiordomo* Gallanzoni. In fact, the cardinal — after having read a copy of the letter sent by Delle Colombe to Clavius — had Gallanzoni write to Galileo asking for an answer (*ibid.*, no. 546, 131–2). A long answer came soon (*ibid.*, no. 555, 141–55), in the form of a private letter to Gallanzoni and Cardinal de Joyeuse ("mio Padrone"). One could speculate that if Delle Colombe had sent his critique of Galileo to the cardinal rather than to Clavius, de Joyeuse may have felt compelled to print the exchange. But probably Delle Colombe could not have written directly to him for he was not known to the cardinal. Again, Delle Colombe paid because of his poor patronage connections.

    However, Delle Colombe's letter (supported also by Brengger's critique of Galileo's views on the lunar mountains) had some impact — at least as a catalyst. In fact, judging from Galileo's correspondence, there seems to have been a great deal of discussion in Rome in the second half of 1611 on the irregularities of the Moon's surface. The pattern of the debate is quite confused because it was carried out mostly through an intricate exchange of letters and relatively informed comments of bystanders. Also, the discussion overlapped with the reverberations of the dispute on buoyancy at Florence and the beginning of that on the sunspots (*ibid.*, no. 534, 118; no. 541, 126–7; no. 545, 130–1; no. 546, 131–2; no. 550, 137; no. 555, 141–55; no. 560, 158; no. 568, 169; no. 572, 174–5; no. 573, 176; no. 576, 178–208; no. 584, 210–11; no. 585, 211; no. 587, 212; no. 588, 213–14; no. 597, 223; no. 599. 226; no. 602, 228–9; no. 612, 237; no. 625, 248; no. 632, 253; no. 665, 285; no. 654, 272–4; and no. 651, 268–9). It seems that this debate was absorbed and superseded by the more spectacular one on sunspots which monopolized the attention of Roman circles in 1612. To conclude, Delle Colombe may have played a major role in triggering this debate, but his name was not attached to it because of his weak patronage links with Roman circles.

    Delle Colombe's strategy was replicated by another adversary of Galileo — Sizi. Although his *Dianoia* was dedicated to Cosimo II, he did not push Galileo to answer it publicly. Consequently, Sizi tried to gain support (and scientific legitimation) for his work from Clavius, probably hoping to force Galileo to answer, *ibid.*, no. 516, 88–89.
143. *Ibid.*, no. 665, 285.
144. See H. G. Alexander (ed.), *The Leibniz–Clarke correspondence* (Manchester, 1956), and Rupert Hall, *Philosophers at war* (Cambridge, 1980). Another example of the role of the patron in managing disputes is offered by Sagredo's challenging Apelle through Welser, *GO*, xi, no. 826, 459.
145. *GO*, no. 683, 304; no. 705, 334; and no. 728, 361.
146. G. Galilei, *Istoria e dimostrazioni intorno alle macchie solari e loro accidenti comprese in tre*

lettere scritte all' illustrissimo signor Marco Velseri Linceo Duumviro d' Augusta e Consigliero di Sua Maesta Cesarea (Rome, 1613).

147. For a patronage-based analysis of the dispute on buoyancy, see my "The anthropology of incommensurability" (ref. 51).
148. W. E. Knowles Middleton, *The experimenters* (Baltimore, 1971), 259–62, 302–3.
149. *Ibid.*, 259.
150. On Galileo's replies to Brengger, see *GO*, xi, no. 452, 14; and no. 453, 14. On the "pietra bononiense", see *ibid.*, no. 549, 136; no. 554, 136; and no. 554, 140. On sunspots, see *ibid.*, no. 637, 257; no. 638, 257–8; no. 662, 281–2; and no. 771, 402. Also, Welser was usually the receiver and the distributor of the works of Galileo's extreme adversaries like Sizi, *ibid.*, no. 503, 77.
151. *Ibid.*, no. 775, 407; no. 776, 408; and no. 683, 303–4. Similarly, even a friend of Galileo like Ciampoli who sided with him during the dispute on buoyancy, described the court debate between Galileo and Papazzoni as "quelle gratiose dispute", *ibid.*, no. 820, 453.
152. *GO*, xii, no. 1156, 212.
153. *Ibid.*, no. 1170, 226–7 (emphasis mine).
154. *Ibid.*, no. 1186, 243.
155. *GO*, xi, no. 554, 140; no. 771, 402; and no. 776, 408.
156. Probably, patrons could not 'identify' themselves with their clients. Such an act would probably have 'dishonoured' them, for it would have implied a lowering of their social status. In a sense, patrons were 'bound to objectivity' by a peculiar kind of *noblesse oblige*.
157. This issue emerged with the very first academy. Cesi faced it when he planned to increase the membership of the Lincei. As a result, difficulties may have developed because people of ifferent social status and who did not know each other would have entered into private correspondence ("nasceranno occasioni spesse di scrivere a molti e differenti e non praticati"). Consequently, Cesi wanted to establish some rule about the titles to be used in the Lincean correspondence ("dare una norma allo scrivere delle lettere e loro titoli"). He thought that the received etiquette that was based on social rather than intellectual distinctions should have been dropped and substituted with an internal set of rules ("e par che convenga alla purità filosofica, che deve professarsi, staccarsi affatto dall'usi aulici e ordinarii, e massime nello scrivere per occasione della Lince o suoi negotii"). It is interesting that the new 'philosophical titles' were supposed to be used when the members interacted as philosophers and not when they acted as private citizens ("poichè basterà a questi [occasions] solo sia ristretta la norma"), *GO*, x, no. 874, 507. Cesi's proposal seemed to reflect an actual concern of the Lincei faced by increasingly frequent cross-class interactions among philosophical equals: "I Signori Lincei di Napoli, et anco di qua, mi fanno istanza che si pongano in uso i titoli studiosi, per ovviare ad ogni scrupolo e poter nelle nove ammissioni, senza ricercar notitia, scriver liberamente et al sicuro; e crescendo il numero e diversi soggetti, par necessario", *ibid.*, no. 903, 538–9. We have a case of one of these etiquette misunderstandings — although among two very upper-class members — in which Welser scolded Faber for not having informed him of Cesi's proper title, *ibid.*, no. 856, 490.
158. The *volume epistolico* was supposed to be a collection of letters exchanged among the Lincei and other interlocutors on scientific subjects. For instance, Galileo's work on sunspots was supposed to be published as a *volume epistolico* including not only Apelle's letter but also replies and critiques by the other Lincei. Even when — under the pressure of Galileo who was probably concerned with stressing his authorship — the *Istorie* were printed as a separate volume, Cesi printed a number of extra copies to be bound later in the *volume epistolico* to come: "bisognarà stamparle in foglio [the *Istorie*] che benchè sarà poco volume, pur sarà principio del volume epistolico che sarà poi grande", *ibid.*, no. 761, 395. See also no. 725, 357.

159. Pushing the analogy between the king's and the secretary's two bodies, I think that in the same way that the king's transcendental body (as a symbol of 'monarchy') legitimized the power of the physical, accidental, mortal king, the secretary (as a symbol of the academic corporation) was given the legitimacy to regulate academic discussions and the theories presented in them by preventing them from being perceived as arbitrary — just as the king's transcendental body allowed for the power of the actual king to be represented as non-arbitrary. This interpretation of the secretary's (or president's) power is supported by the evidence presented by Shapin in "The house of experiment" (ref. 14).

    The 'splitting of the body' seems related to a situation in which the members of the corporations are equals, like a king and his dynasty, or the secretary of a scientific academy and his fellow members. Instead, this does not happen in the case of the Lincei or of the Cimento who were like monarchies ruled by a prince. In that case, the legitimacy of the group came directly from the prince.

160. P. Bourdieu and J. C. Passeron, *La reproduction: Éléments pour une théorie du système d'enseignement* (Paris, 1970).
161. *Ibid.*, 82.
162. A. Viala, *La naissance de l'écrivain* (Paris, 1985), ch. 2, "les ambivalences du clientelisme et du mécenat", 51–84.
163. *Ibid.*, 222.
164. "Io non fu' mai pittore nè scultore, come chi ne fa bottega", Michelangelo, letter of 2 May 1548, *Carteggio*, quoted in P. Burke, *Culture and society in Renaissance Italy 1420–1540* (Princeton, 1986), 80. The mechanical connotation of "aver bottega" is confirmed by Giorgo Vasari who referred to a minor painter as "di questi che stanno a bottega aperta pubblicamente a lavorare a ogni cosa meccanica", *ibid.*, 90.
165. Z. Wazbinski, *L'Accademia del Disegno a Firenze nel cinquecento* (Florence, 1987), i, 111–76.
166. Michelangelo's 'divinity' was institutionally appropriated by the Florentine artists who transformed him into a sort of patron saint of the profession. His extraordinary status as an artist was instrumental in presenting the entire artistic profession as having high social status — something it was previously missing. It is not by chance that the foundation of the Accademia del Disegno coincided with the Florentine funeral of Michelangelo in 1664 (which the Accademia itself had organized).

    I would suggest that the funerary monument that Galileo's supporters tried (unsuccessfully) to construct in Santa Croce immediately after Galileo's death may have been aimed at something similar. Galileo was to become the 'patron saint' of the new breed of mathematicians — the 'philosophical ones'. The extraordinary status Galileo had obtained as a mathematician was probably supposed to help improve the mathematicians' status in the same way Michelangelo's 'divinity' had helped the former painters, architects, and sculptors to become 'artists'. It is interesting that now Galileo and Michelangelo's tombs are in the same church, facing each other, and that both mausoleums are actual monuments to their professions. Michelangelo is surrounded by muses symbolizing architecture, painting, and sculpture (the three visual arts he helped to legitimize), while Galileo is surrounded by more muses symbolizing the mathematical sciences which he was able to bring up to the status of philosophy.
167. *Ibid.*, no. 266, 284: "Il pensiero di V.S. intorno al porre i nomi a i nuovi pianeti trovati da lei, con inscrivergli dal nome del Serenissimo padrone, è *generoso et heroico* ..." (emphasis mine). Galileo agreed with Vinta about the 'heroicness' of his discovery and dedication, no. 217, 298.
168. We find five months between Galileo's dedication to the Medici (*GO*, x, no. 265, 13 February 1610, 282–4) and the Grand Duke's official deliberation (*ibid.*, no. 359, 10 July 1610, 400–1). Some offer about a post at the Medici court is passed on by Vinta to Galileo during his visit to the court in Pisa during the Easter vacation. During these months, Galileo

informs Vinta of the various attacks on the reality of the Medicean Stars he has responded to (*ibid.*, no. 307, 348–53). But the Medici, while accepting with pleasure the dedication, do not seem to rush to bring Galileo to court. With the uncommitted attitude typical of patrons, they seem to observe how the dispute is developing. But Galileo thinks that their distance is a bit excessive, and that a stronger or quicker endorsement from their side would help to end the dispute (*ibid.*, no. 307, 349; and no. 339, 379).

169. Biagioli, "Galileo the emblem-maker" (ref. 28).
170. *Archivio di Stato di Firenze*, "Depositeria generale" (Ruoli della famiglia del Granduca). Galileo's salary was not paid by the Medici Treasury — the Depositeria generale — but by the University di Pisa. This can be interpreted in two ways. Perhaps the Medici wanted to avoid charging such a large salary on the court budget, or — by the fact that Galileo did not actually work or have any specific role at court — they really meant to have him at court as a "gentiluomo non provvisionato" while giving him the salary from Pisa as a sort of sinecure. This second interpretation would find support in what Viala has observed in France. There the 'Grands' would reward their top clients not through salaries drawn from payroll funds, but with payments coming from different, less salary-connoted sources. The reward of a great client was called 'gratification' and came from "une rubrique budgetaire speciale", while the salaries of lesser clients were simply called "émoluments ordinaires", Viala, *La naissance de l'écrivain* (ref. 162), 56–57.
171. *GO*, x, no. 434, 480–3.
172. Westfall, "Science and patronage" (ref. 5), 29.
173. *Ibid.*, 26.
174. *Ibid.*, 12.
175. *Ibid.*, 26–27.
176. For instance, Paolo Gualdo writing to Galileo in May 1611 saw a clear distinction between the acceptance of Galileo's observations *qua* observations and their Copernican interpretation, and thought that Galileo got enough recognition for the former without having to push for the latter: "A me pare che gloria s'habbia acquistata con l'osservanza nella luna, ne i quattro Pianeti, e cose simili, senza pigliare a diffendere cosa tanto contraria all'intelligenza e capacità de gli huomini, essendo pochissimi quelli che sappiano che cosa voglia dire l'osservanza de' segni et aspetti celesti", *GO*, xi, no. 526, 100–1.
177. *GO*, x, no. 307, 349; and no. 339, 379–82.
178. This, I think, accounts for the Jesuits' ease in endorsing Galileo's telescopic observations from December 1610 (*ibid.*, no. 437, 484–5). Moreover, when they were asked for an official report on Galileo's discoveries in the spring of 1611, they stressed the accuracy of Galileo's observation of the phases of Venus ("e verissimo che Venere si scema et cresce come la luna ...", *ibid.*, no. 520, 93). Being able to fit Galileo's discoveries within the Tychonic framework, the Jesuits did not perceive them as threatening, but rather as important contributions toward the legitimation of mathematics in relation to philosophy — a battle Clavius had been waging since his early attempts to secure for mathematics a fair position within the Ratio Studiorum.
179. That astronomical discoveries did not need to be perceived as necessarily offering evidence for the Copernican system but that they were rather seen as refutations of the philosophers' beliefs is something that characterized the debate on the nova of 1604. For instance, a friend of Galileo's — the astrologer Altobelli — saw the nova as shattering the beliefs of the 'half-philosophers': "In tanto mi piace che V.S. si sia accorta di questo nuova mostro nel cielo, da far impazzire i Peripatetici, ch'hanno creduto sin hora tante bugie in quella nova e miracolosa, priva di moto e parallasse", *ibid.*, no. 106, 117. Altobelli continues his attack on the 'half-philosophers' in a later letter (*ibid.*, no. 107, 118–20). Similarly, Galileo's *Dialogo di Cecco da Ronchitti in perpuosito della stella nova* which attacked the philosopher's belief in the immutability of the heavens, mentioned

Copernicus only once in passing and in only one of its two editions (S. Drake, *Galileo against the philosophers* (Los Angeles, 1976), 28–32).

180. *GO*, x, no. 57, 67–68; and no. 59, 69–71.