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Rethinking Scholarship: Data Analytics in Chinese Buddhist Philology

Christine L. Borgman

Distinguished Professor and Presidential Chair in
Information Studies

University of California, Los Angeles

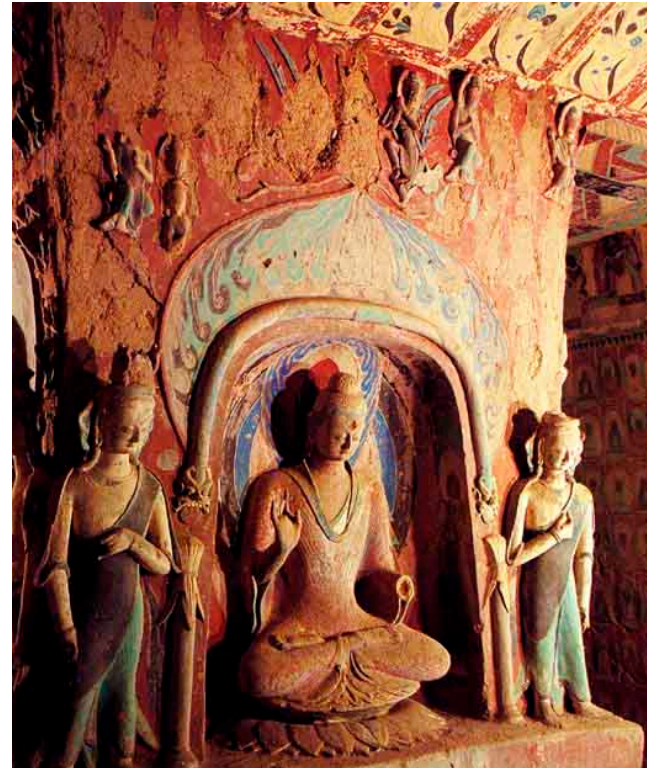
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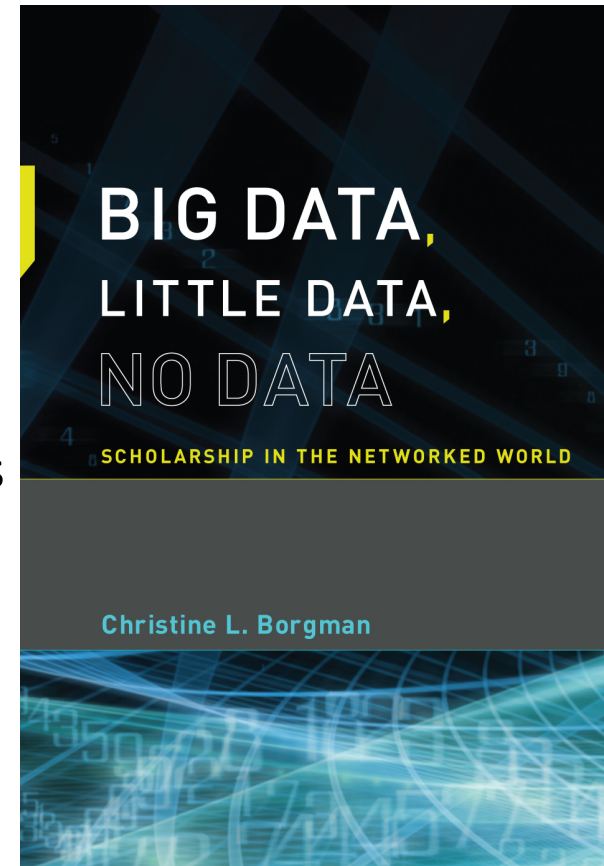
Pacific Neighborhood Consortium Conference

Getty Center, Los Angeles, August 17, 2016



Big Data, Little Data, No Data: Scholarship in the Networked World

- Part I: Data and Scholarship
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 - Ch 2: What Are Data?
 - Ch 3: Data Scholarship
 - Ch 4: Data Diversity
- Part II: Case Studies in Data Scholarship
 - Ch 5: Data Scholarship in the Sciences
 - Ch 6: Data Scholarship in the Social Sciences
 - Ch 7: Data Scholarship in the Humanities
- Part III: Data Policy and Practice
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MIT Press, 2015



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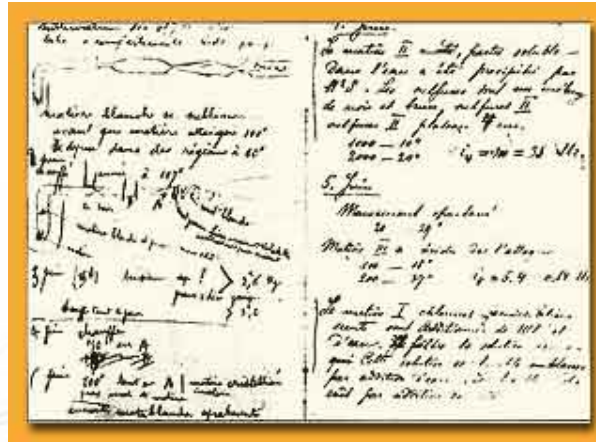


Data

What are data?



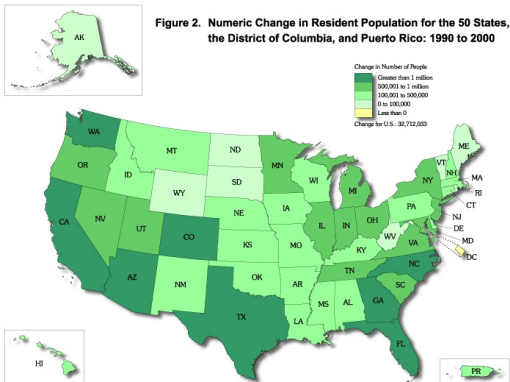
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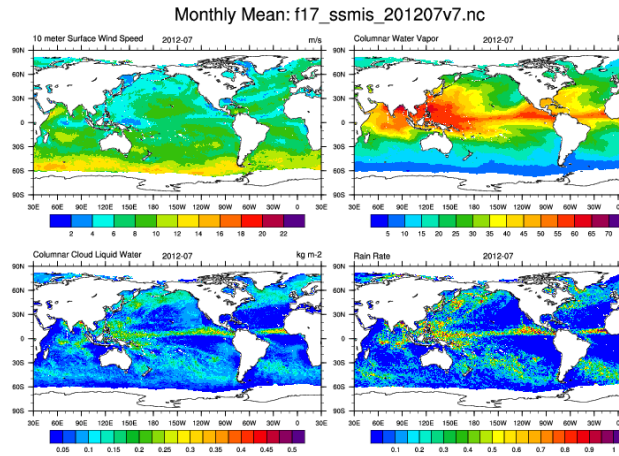
Marie Curie's notebook aip.org



Pisa Griffin



<http://www.census.gov/population/cen2000/map02.gif>



ncl.ucar.edu

Date: 1/2.07.75 Place: Sakaltutan Zafor

He will grow old in his present house; new house is for sons - 5 sons. Not sure they want to live in village. He will only build another if they want him to. eS came from Germany and did the plastering. He arranged the carpentry in Kayseri. Çok para gitti. (much money went) Has a tractor.

Date: July 1980 Place: Sakaltutan Zafor:

Household now Zafor and wife; Nazif Unal and wife and youngest son, still a boy. They run two dolmuş; one with a driver from Süleymanlı. Goes in and out once a day. He gets 8,000 a month. Zafor then said, keskin deoil. (not sharp - i.e.? not profitable) I said he did very well on 8,000 TL with only two journeys a day. Nazif Unal has "bought" a Durak (dolmuş stop) from Belediye and works all day in Kayseri.

http://onlineqda.hud.ac.uk/Intro_QDA/Examples_of_Qualitative_Data.php

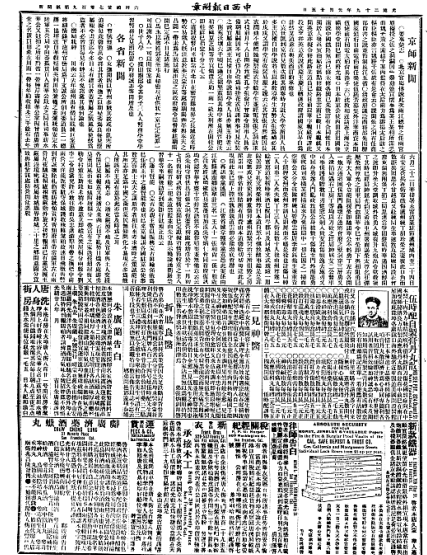


Data are representations of observations, objects, or other entities used as evidence of phenomena for the purposes of research or scholarship.

C.L. Borgman (2015). *Big Data, Little Data, No Data: Scholarship in the Networked World*. MIT Press

Sustaining value in data

- Born digital
 - Malleable, reusable
 - Migrate to new technologies
- Digitized formats
 - Digital encoding
 - Static representations



Screen shot of searching and highlighting in CBETA, 2013. Photo by C.L.Borgman; computer of S.Zacchetti, used with permission

Chung hsi jih pao [microform] = Chung sai yat po, February 21, 1903; Alternative Title: Zhong xi ri bao; Chung Sai Yat Po Pub. Co, Publisher; February 21, 1903

Opening a box of data: Chinese Buddhist Philology



Stefano Zacchetti
Yehan Numata Professor of Buddhist Studies
Oriental Institute
University of Oxford
Fellow, Balliol College

Scholarly Inquiry

- How were Chinese Buddhist texts communicated across languages and cultures in the third to fifth centuries C.E.?
- Data sources: texts in multiple languages, scripts, and media
- Analysis:
 - Close: side by side comparisons
 - Distance: data mining of digitized texts



What are his data?

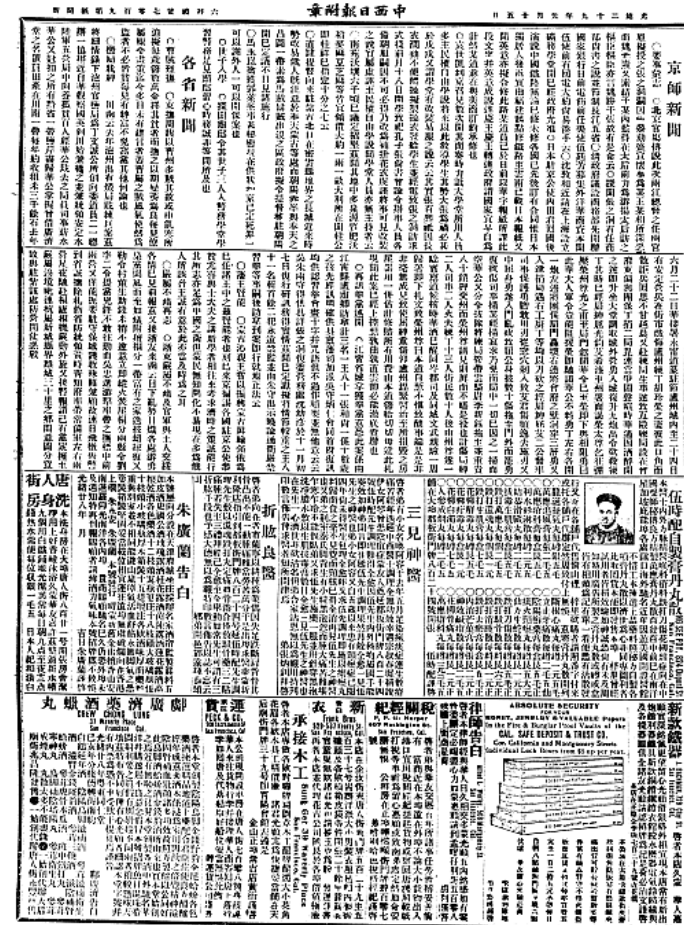
- Evidence of similar or dissimilar origins
- Observations of textual characteristics
- Units of data
 - Individual characters, punctuation marks
 - Words, phrases, sections, chapters
 - Artifacts, texts
 - Entities
 - Collections of texts



Microfilm as Data Source



<http://www.clarkehistoricallibrary.org/2011/01/digital-microfilm-readers-popular-with.html>



Chung hsi jih pao [microform] = Chung sai yat po, February 21, 1903
Alternative Title: Zhong xi ri bao
Chung Sai Yat Po Pub. Co, Publisher; February 21, 1903

Bricks in the wall...



Brick inscribed with the Sutra on Dependent Origination *Gorakhpur district, late 5th century - early 6th century AD. Ashmolean Museum*

Transliterated Chinese characters

In order to accommodate the durative/ frequency expressions, it is proposed that the latter are adjoined to the left of V' (Huang, Li, Li 2009:100). Their post-verbal appearance is then the consequence of verb raising across them. An alternative to "adjunction to V'" (also mentioned by Ernst, 2014) is to postulate that durative/frequency expressions in Chinese are actually in the unique SPEC position of Larsonian VP Shells. This would explain why the co-occurrence of multiple Frequency/Durative expressions is not allowed in Chinese.

Gu (1995) notes that in Chinese there are some "verbal measure phrases" that need to be analyzed in a different way from Durative/Frequentative⁸⁰. One of the features they show is the possibility to either follow or precede the post-verbal object. See the following examples (from Gu 1995:64 example 25):

- (331) Zhangsan ti-le **yi jiao** nei-ge ren
Zhangsan kick-ASP one foot that-CL person
'Zhangsan gave that man a kick.'
- (332) Zhangsan ti-le nei-ge ren **yi jiao**
Zhangsan kick-ASP that-CL person one foot
'Zhangsan gave that man a kick.'

The analysis proposed is that **yijiao** may be base-generated in COMPL of VP and raise together with V to the v head.

In general, the order of base-generation of the verb arguments is associated with a thematic hierarchy. The one proposed by Larson (1988) is Agent > Theme > Goal > Oblique (manner, location, time). For Chinese, Huang (1991) has proposed an alternative: Agent > Experiencer > referential theme > goal, indirect Object > obliques (non-referential theme⁸¹, direction, duration/frequency, manner ...) ⁸². The lowest role in the thematic hierarchy corresponds to the lowest position in the VP-Shell structure. Cinque (2009, 2010) proposes that all DP/PP arguments occupy a SPEC position: he therefore eliminates the COMPL position as a base-generation position for verbal arguments. The resulting structure is consistent across languages, with word order differences to be derived through movement of the verb.

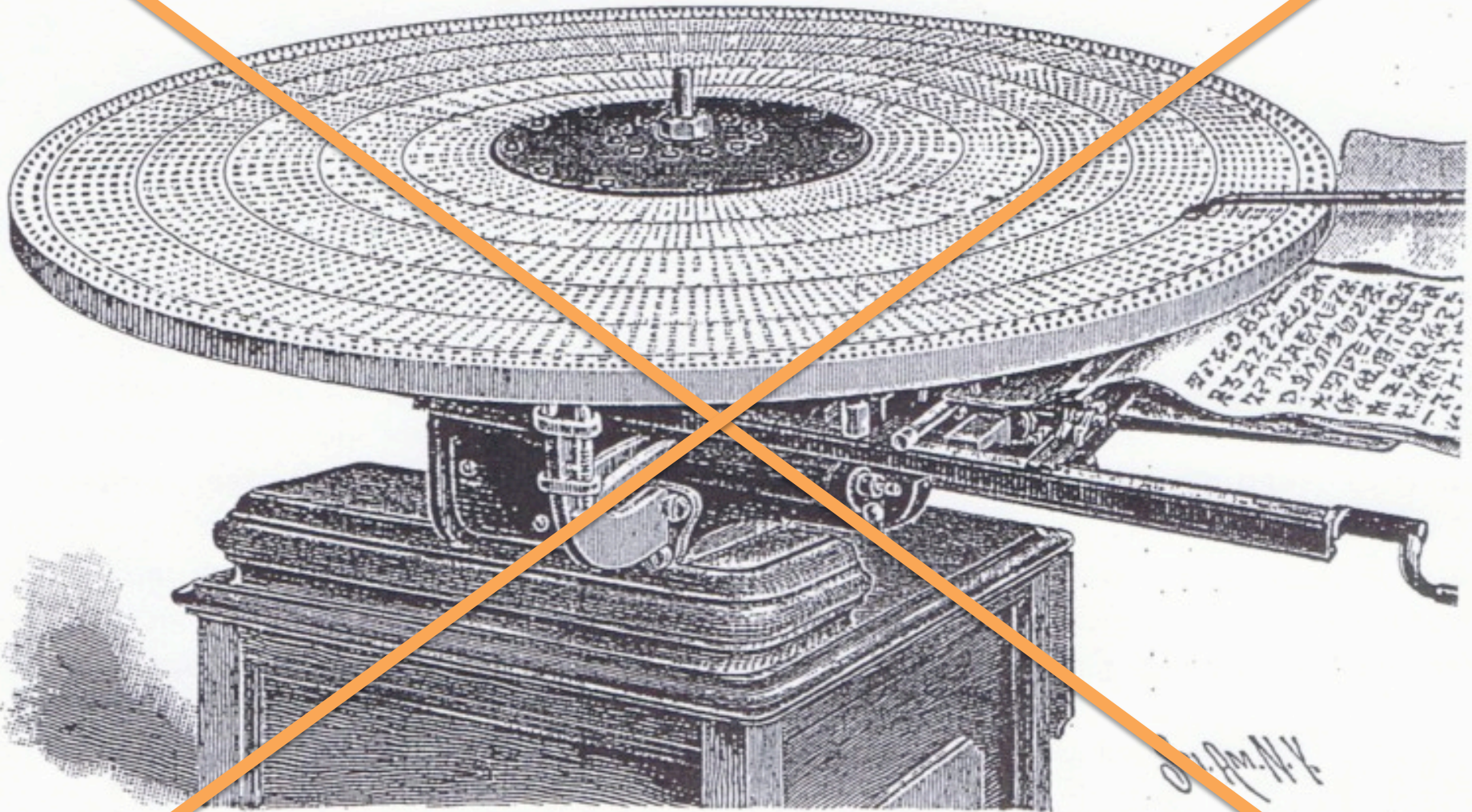
⁸⁰ On verbal classifiers, see also Matthews & Yip (1999).

⁸¹ Non-referential theme refers to the 'dummy' objects such as *fan* in *chi fan* (lit. 'eat food' → 'eat') or *bu* in *pao bu* (lit. 'run step' → 'run').

⁸² In Chinese temporal adjuncts, place and preverbal manner need to be in higher position in order to justify the pre-verbal position.



The syntax of adverbials in Chinese and Italian
Nadia Camporese, 2014, PhD, University of Hong Kong



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`	1	2	3	4	5	6	7	8	9	0	<	=	Backspace
Tab	q	w	e	r	t	y	u	i	o	p	[]	\
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Bibliotheca Philologica et Philosophica Buddhica

Editor-in-Chief: Hiroshi KAN'NO

Volume VIII

In Praise of the Light

**A Critical Synoptic Edition with an Annotated Translation of
Chapters 1-3 of Dharmarakṣa's *Guang zan jing* 光讚經,
Being the Earliest Chinese Translation of
the Larger *Prajñāpāramitā***

Stefano ZACCHETTI

The International Research Institute for Advanced Buddhology
Soka University
Tokyo 2005

- (150c 9-12) 瞋恚心，無懈怠心，不欲發起於亂心者，又不欲起愚癡心者，當學般若波羅蜜。
- punar aparaṃ śāradvatīputra
bodhisattvena mahāsattvena dāne
'navagr̥hītacittena³³⁴ bhavitukāmena³³⁵
dauḥśīlyacittam pṛthakkartukāmena³³⁶
vyāpādacittam utsraṣṭukāmena³³⁷
kausidyacittam³³⁸ dauṣprañācittam
anutpāday[i]tukāmena³³⁹
prañāpāramitāyāṃ śikṣitavyam* //
- § 1.167 復次，舍利弗，菩薩摩訶薩欲立衆生於布施德、持戒、智慧、勸令、修治所受福德當所興爲¹，當學般若波羅蜜。
- (150c 12-14)
- PD 29, 18-30, 2 (cf. PG 13v 6-8, Ś 95, 20-96, 11): punar etc. bodhisattvena etc. sarvasattvān dānamaya puṇyākriyāvastuni³⁴⁰ pratiṣṭhāpayitukāmena śīlamaya puṇyākriyāvastuni pratiṣṭhāpayitukāmena bhāvanā mayapūṇyākriyāvastuni pratiṣṭhāpayitukāmena vaiyāvṛtyasahagate³⁴¹ caupadhike³⁴² puṇyākriyāvastuni pratiṣṭhāpayitukāmena prañāpāramitāyāṃ etc.
- ¹ 爲：者 Kr
- § 1.168 復次，舍利弗，菩薩摩訶薩欲興五眼，當學般若波羅蜜。何謂五眼？肉眼、天眼、慧眼、法眼、佛眼。{當學般若波羅蜜}
- (150c 14-17)
- PD 30, 3-4 (PG 13v 8-10; Ś 96, 11-20): punar aparaṃ śāriputra bodhisattvena mahāsattvena³⁴³ pañca cakṣuṃṣy utpādayitukāmena³⁴⁴

³³⁴ Ś 95, 10-11: dānena ca gr̥hītacittena! Cf. D 150c 10: 心無所受; and especially PekK 36b 4: *shyin ba la thogs pa med pa'i sems dang ldan par* etc.

³³⁵ In correspondence of this, PD 29, 14 has: mātsaryacittam nigrahītukāmena (so also X 9c 8-9).

³³⁶ PD 29, 15: anutpādayitukāmena (so also D).

³³⁷ PD 29, 16: anutpādayitukāmena.

³³⁸ Ś 95, 16 + anutpādayitukāmena; PD 29, 16 + *utsraṣṭukāmena. Then Ś 95, 17-18 and PD 29, 17 list also the expected passage corresponding, within the scheme of the *pāramitās*, to *dhyāna* (indeed found also in D and others): ... bodhisattvena etc. vikṣepacittam anutpādayitukāmena [PD vikṣiptacittam niścītukāmena (for -cetu-?)] etc. In all likelihood, the scribe of PG skipped a portion including the verb governing kausidyacittam and the following passage.

³³⁹ PD 29, 18: aprapañcitukāmena.

³⁴⁰ PG 13v 7 & Ś 96, 1 not as a compound: dānamaye puṇyākriyāvastuni etc. (so also the following terms).

³⁴¹ PG 13v 7: vaiy[ā]pṛtyasahagate (cf. BHSD 511a-b); Ś 96, 7-8: airyyāpathasahagate (cf. BHSD 158a).

³⁴² PG 13v 7 & Ś 96, 10: sarvauśadhikasahagate. Cf. Lamotte V 2246 for an exam of the various versions of this passage; on Ś he remarks: “corriger: *aupadhikasahagata*”.

³⁴³ PG 13v 8 + sarvākārāṇi; Ś 96, 12: sarvvākāraṃ.

³⁴⁴ PG 13v 9 & Ś 96, 12: niṣpādayitukāmena, *passim*.

INTRODUCTION – CHAPTER 1

()	restored <i>akṣara</i> (s)
[]	damaged <i>akṣara</i> (s)
<< >>	interlinear insertion
{ }	erased <i>akṣara</i> (s)
< >	omitted <i>akṣara</i> (s)
{ }	superfluous <i>akṣara</i> (s)
*	<i>virāma</i>
..	one illegible <i>akṣara</i>
.	illegible part of an <i>akṣara</i>
<u>h</u>	<i>jihvāmūliya</i>
ḥ	<i>upadhmāniya</i>
:	<i>visarga</i> used as punctuation mark
●	dot-like punctuation mark
//	double stroke used as punctuation mark
'	<i>avagraha</i> , not written in the MS
† ... †	corrupt passage

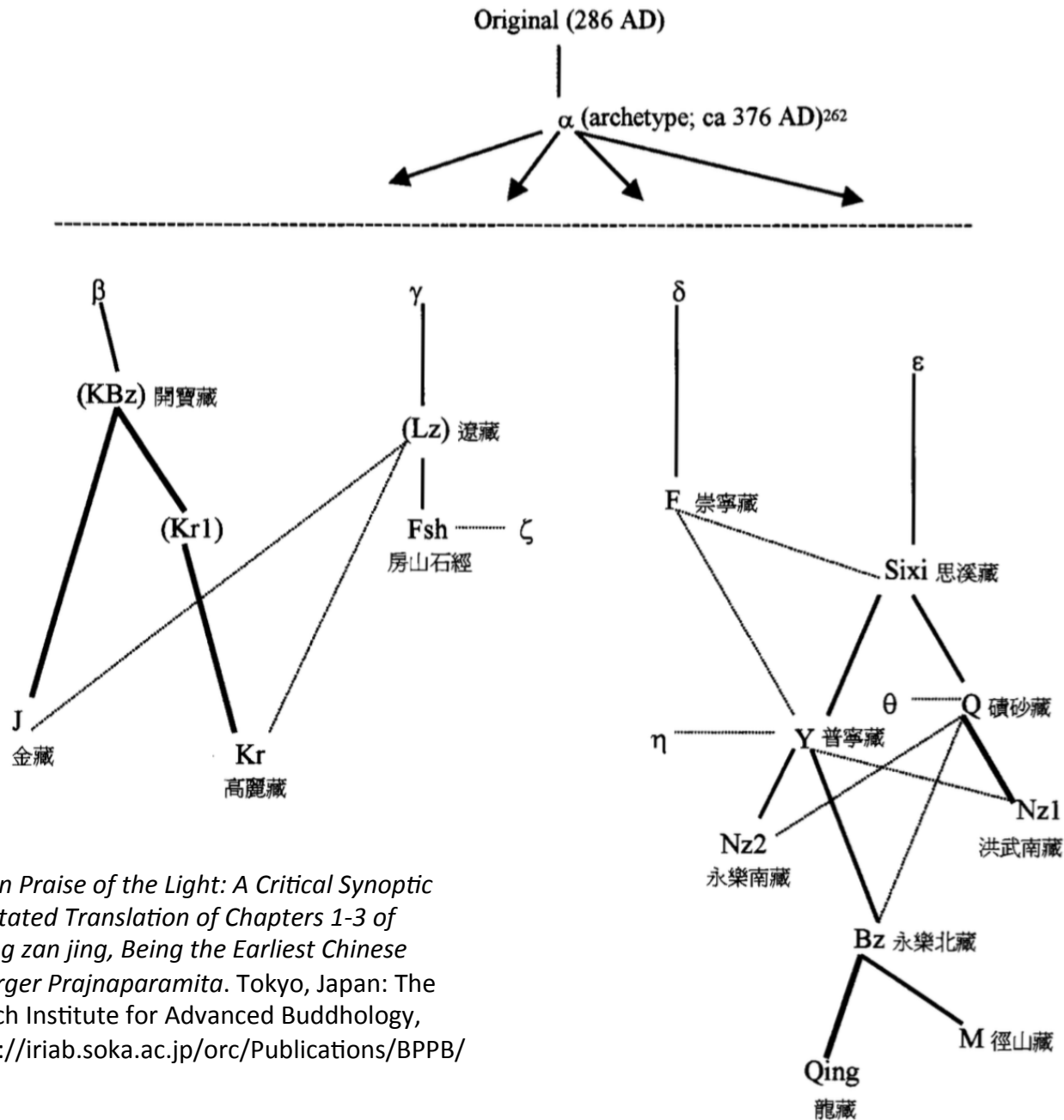
Zacchetti, S. (2005). *In Praise of the Light: A Critical Synoptic Edition with an Annotated Translation of Chapters 1-3 of Dharmarakṣa's Guang zan jing, Being the Earliest Chinese Translation of the Larger Prajnaparamita*. Tokyo, Japan: The International Research Institute for Advanced Buddhology, Soka University. Retrieved from http://iriab.soka.ac.jp/orc/Publications/BPPB/index_BPPB.html

3	Beginning of roll 3		3b 行空品第三下	159b 23
		Beginning of roll 3	4 歎等品第四	161a 12
			5 授決品第五	161c 2
			6 分別空品第六	162a 25
4			7 了空品第七	165a 19
			8 假號品第八	167a 1
5			9 行品第九	171a 24
			10 幻品第十(之上 Y, M)	174b 11
6			10 幻品第十(之下 Y, M)	176b 11
			11 摩訶薩品第十一	178a 15
7			12 等無等品第十二	181b 12
			13 大乘品第十三	182b 14
			14 乘大乘品第十四	184c 26
			15 無縛品第十五	185b 20
8			15 無縛品第十五(下 Y)	186c 28
			16 三昧品第十六	188c 21
9			17 觀品第十七	193a 17
			18 十住品第十八	196b 7
10			19 所因出衍品第十九	199a 12
			20 無去來品第二十	200c 3
			21 衍與空等品第二十一	201c 27

The only difference is in the beginning of roll 3, which occurs in the middle of chapter 3b in the most direct offspring of Sixi (Q and its tracing Nz1), while in the remaining editions it coincides with the beginning of chapter 4. The latter is very probably an innovation adopted by the editors of Y, and it proves in turn very helpful for establishing further, more precise subdivisions in the lower reaches of the family (see § 3.3.2 below).

Zacchetti, S. (2005). *In Praise of the Light: A Critical Synoptic Edition with an Annotated Translation of Chapters 1-3 of Dharmaraksā's Guang zan jing, Being the Earliest Chinese Translation of the Larger Prajnaparamita*. Tokyo, Japan: The International Research Institute for Advanced Buddhology, Soka University. Retrieved from http://iriab.soka.ac.jp/orc/Publications/BPPB/index_BPPB.html

Stemma of the printed editions of the *Guang zan jing* 光讚經



Zacchetti, S. (2005). *In Praise of the Light: A Critical Synoptic Edition with an Annotated Translation of Chapters 1-3 of Dharmarakṣa's Guang zan jing, Being the Earliest Chinese Translation of the Larger Prajñāpāramitā*. Tokyo, Japan: The International Research Institute for Advanced Buddhism, Soka University. http://iriab.soka.ac.jp/orc/Publications/BPPB/index_BPPB.html



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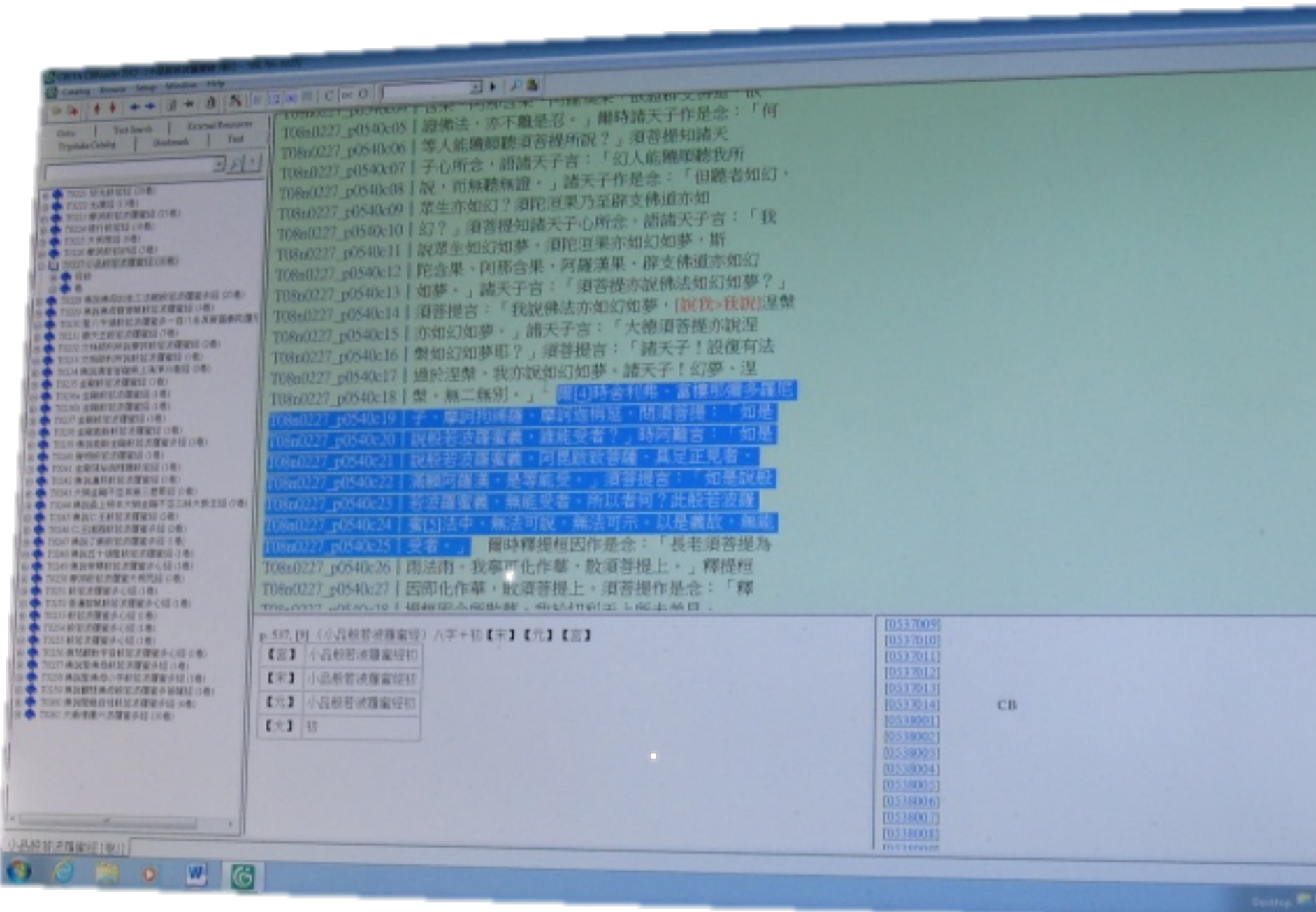
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T08n0227_p0540c05 | 證佛法，亦不難是忍。」爾時諸天子作是念：「何
 T08n0227_p0540c06 | 等人能隨即聽須菩提所說？」須菩提知諸天
 T08n0227_p0540c07 | 子心所念，語諸天子言：「幻人能隨即聽我所
 T08n0227_p0540c08 | 說，而無聽無證。」諸天子作是念：「但聽者如幻，
 T08n0227_p0540c09 | 眾生亦如幻？須陀洹果乃至辟支佛道亦如
 T08n0227_p0540c10 | 幻？」須菩提知諸天子心所念，語諸天子言：「我
 T08n0227_p0540c11 | 說眾生如幻如夢，須陀洹果亦如幻如夢，斯
 T08n0227_p0540c12 | 陀含果、阿那含果、阿羅漢果、辟支佛道亦如幻
 T08n0227_p0540c13 | 如夢。」諸天子言：「須菩提亦說佛法如幻如夢？」
 T08n0227_p0540c14 | 須菩提言：「我說佛法亦如幻如夢，**我說我說涅槃**
 T08n0227_p0540c15 | 亦如幻如夢。」諸天子言：「大德須菩提亦說涅
 T08n0227_p0540c16 | 槃如幻如夢耶？」須菩提言：「諸天子！設復有法
 T08n0227_p0540c17 | 過於涅槃，我亦說如幻如夢。諸天子！幻夢、涅
 T08n0227_p0540c18 | 槃，無二無別。」**爾時舍利弗、當樓那、多羅尼**
 T08n0227_p0540c19 | **子、摩訶拘絺羅、摩訶遮栴延、問須菩提：「如是**
 T08n0227_p0540c20 | **說般若波羅蜜義，誰能受者？」時阿難言：「如是**
 T08n0227_p0540c21 | **說般若波羅蜜義，阿毘跋致菩薩、具足正見者、**
 T08n0227_p0540c22 | **滿願阿羅漢，是等能受。」須菩提言：「如是說般**
 T08n0227_p0540c23 | **若波羅蜜義，無能受者，所以者何？此般若波羅**
 T08n0227_p0540c24 | **蜜[5]法中，無法可說，無法可示，以是義故，無能**
 T08n0227_p0540c25 | **受者。」**爾時釋提桓因作是念：「長老須菩提為
 T08n0227_p0540c26 | 雨法雨，我寧可化作華，散須菩提上。」釋提桓
 T08n0227_p0540c27 | 因即化作華，散須菩提上。須菩提作是念：「釋

p. 537. [8] (小品般若波羅蜜經) 八字+切【宋】【元】【宮】

【宮】	小品般若波羅蜜經切
【宋】	小品般若波羅蜜經切
【元】	小品般若波羅蜜經切
【六】	切

05370099
05370100
05370111
05370112
05370113
05370114
05380001
05380002
05380003
05380004
05380005
05380006
05380007
05380008
File Browser

CB

Screen shot of searching and highlighting in CBETA, 2013. Photo by C.L.Borgman; computer of S.Zacchetti, used with permission

不受之
成
世間
無解、無稱、無譽、
所受見知。
其

4聲: FS, OS, S,

T12n0322_p0016b21 ...以憂人事。不自忽其事，有恩在人。訖終
T12n0322_p0016b22 不望其報。作恩施若干，知恩，知反。復為造
T12n0322_p0016b23 行恩德。貧者為施財。諸恐畏者為安隱之。
T12n0322_p0016b24 憂惑者寬解其憂。[諸]¹無力者忍默之。諸豪強
T12n0322_p0016b25 者損²憍慢。以棄殊過慢尤。慢³以恭敬尊長。
T12n0322_p0016b26 承事多聞者。能問明知⁴者。所現以直不虛
T12n0322_p0016b27 飾。眾人而有方便。行德而可求哉。為多聞不
T12n0322_p0016b28 厭無足。
¹無: S,Y,M 諸+無 ²損: OS,S,Y,M 捐 ³慢: OS,S,Y,M 慢+慢 [there is also an
additional character in FS, but it is not legible to my eye] ⁴知: FS, OS,S,Y,M 智*

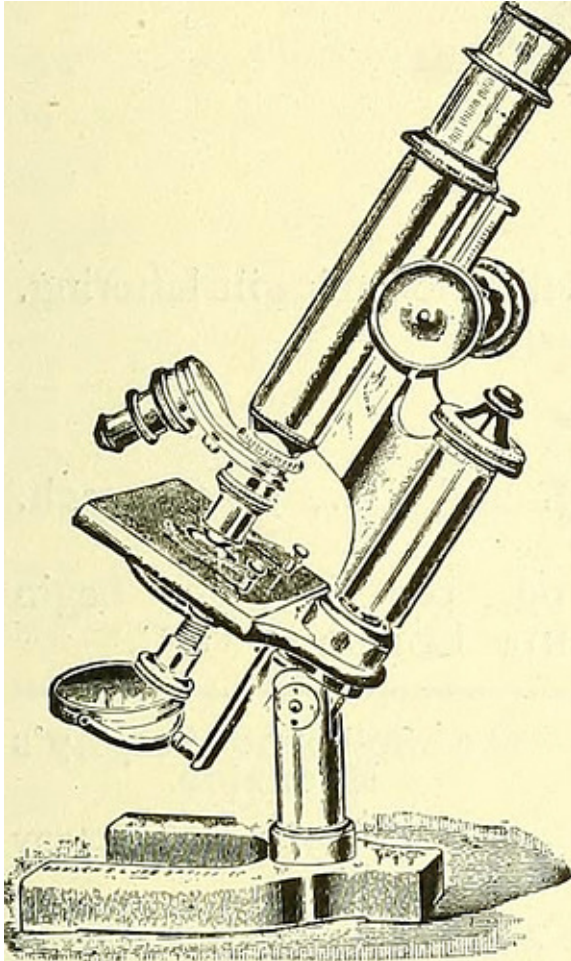
T12n0323_p0024a19 不捨所行令人亦爾。所作究竟無有猶豫。常
T12n0323_p0024a20 有反復所建輒善。見貧窮者矜濟以財。恐
T12n0323_p0024a21 懼者為無畏救。愁憂者慰除所患。羸劣者喻
T12n0323_p0024a22 使忍辱。豪強者令無憍慢。貢高者令不自
T12n0323_p0024a23 大。奉敬尊長諂啟舊德。親近博智請問方術
T12n0323_p0024a24 以悟其疑。常為直見心無諂偽。等哀一切行
T12n0323_p0024a25 無適莫無有害心。不別種性無所怖求。

T11n0310_p0473b12 助成他務捨己所
T11n0310_p0473b13 作。無所希望有所為作。而不中捨捨念恩。
T11n0310_p0473b14 善為所作施貧封祿。有勢力者折大憍慢。於
T11n0310_p0473b15 無勢力而慰喻之。除他憂忍下劣者。除捨
T11n0310_p0473b16 憍慢及增上慢。恭敬尊重親近多聞。諮問
T11n0310_p0473b17 明慧。所見正直。所行無為。無有幻惑。於諸
T11n0310_p0473b18 眾生無有作愛。修善無足多聞無厭。

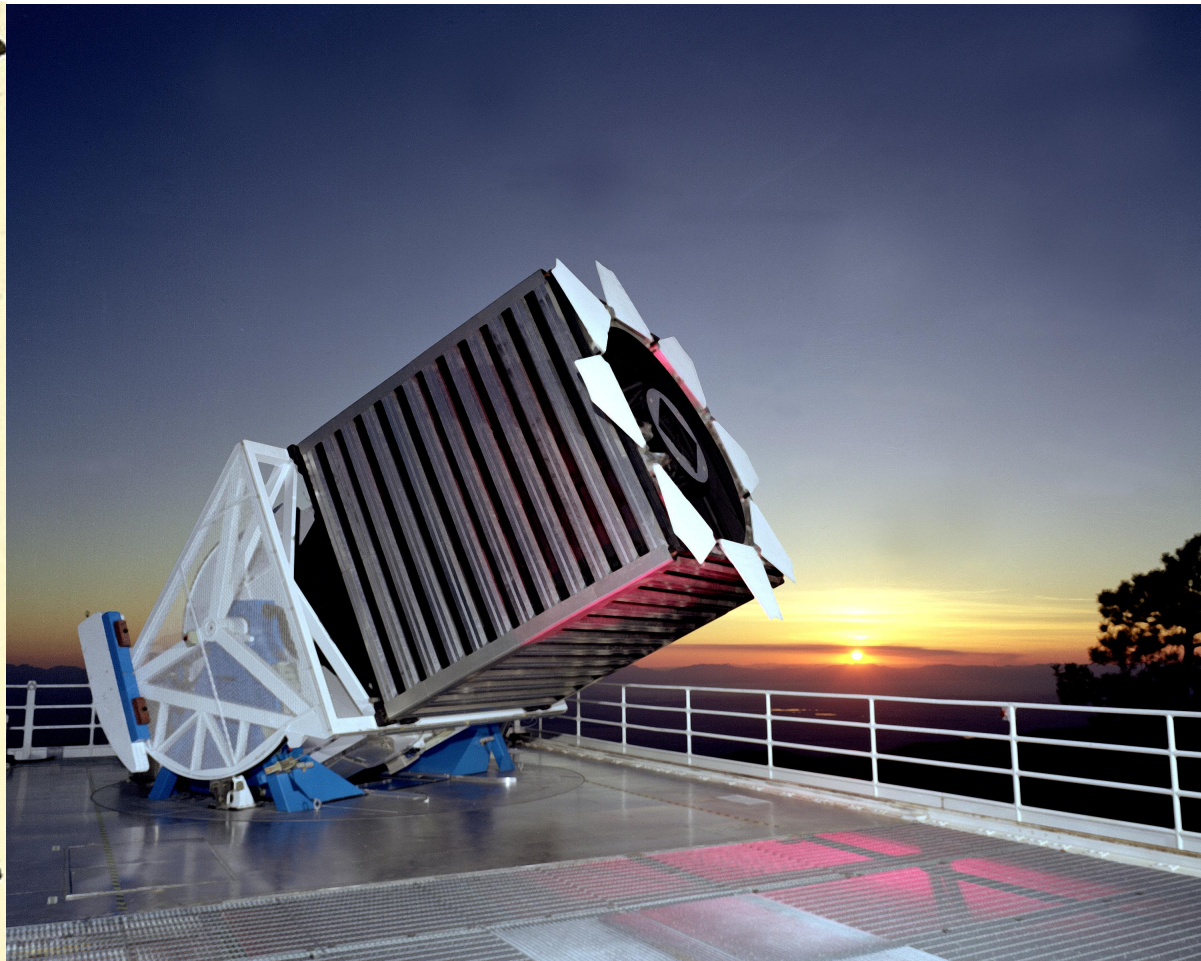
Dbhv:
T26n1521_p0056a12 能捨於自利
T26n1521_p0056a13 常勤行他利 深知恩倍報
....
T26n1521_p0056b05 貧者施以財 畏者施無畏
T26n1521_p0056b06 如是等功德 乃至於堅牢
T26n1521_p0056b07 施貧以財者。有人先世不種福德。今無方
T26n1521_p0056b08 便資生儉少。如是之人隨力給恤。施無畏
T26n1521_p0056b09 者。於種種諸怖畏。若怨賊怖畏飢餓怖畏水
T26n1521_p0056b10 火寒熱等。菩薩於此眾怖畏中教喻諸人。
T26n1521_p0056b11 安隱歡悅令無怖畏。如是功德最堅牢。最
T26n1521_p0056b12 在後者於諸憂者為除其憂。於無力者而
T26n1521_p0056b13 行忍辱。離慢大慢等。於諸所尊深加恭敬。
T26n1521_p0056b14 於多聞者常行親近。於智慧者諮問善惡。
T26n1521_p0056b15 自於所行常行正見。於諸眾生不諂不曲
T26n1521_p0056b16 不作假愛。求善無厭多聞無量。

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CBETA as Microscope and Telescope



Commons photo: Science Gossip, 1894



Telescope for the Sloan Digital Sky Survey, Apache Point, New Mexico

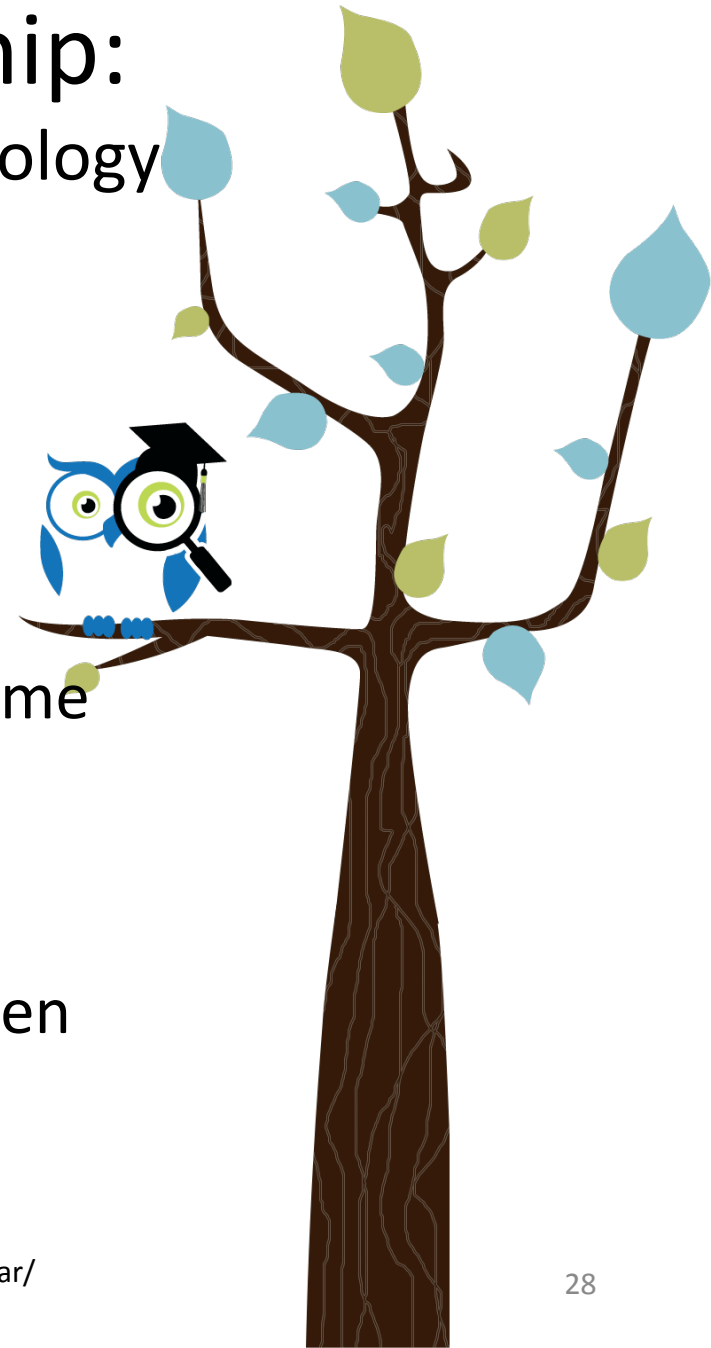
Data Scholarship: Chinese Buddhist Philology

- Data Types
 - Texts as material objects
 - Images of texts
 - Digital texts
- Data Sources
 - Libraries, archives
 - Private collections
 - Personal collections
 - Public collections



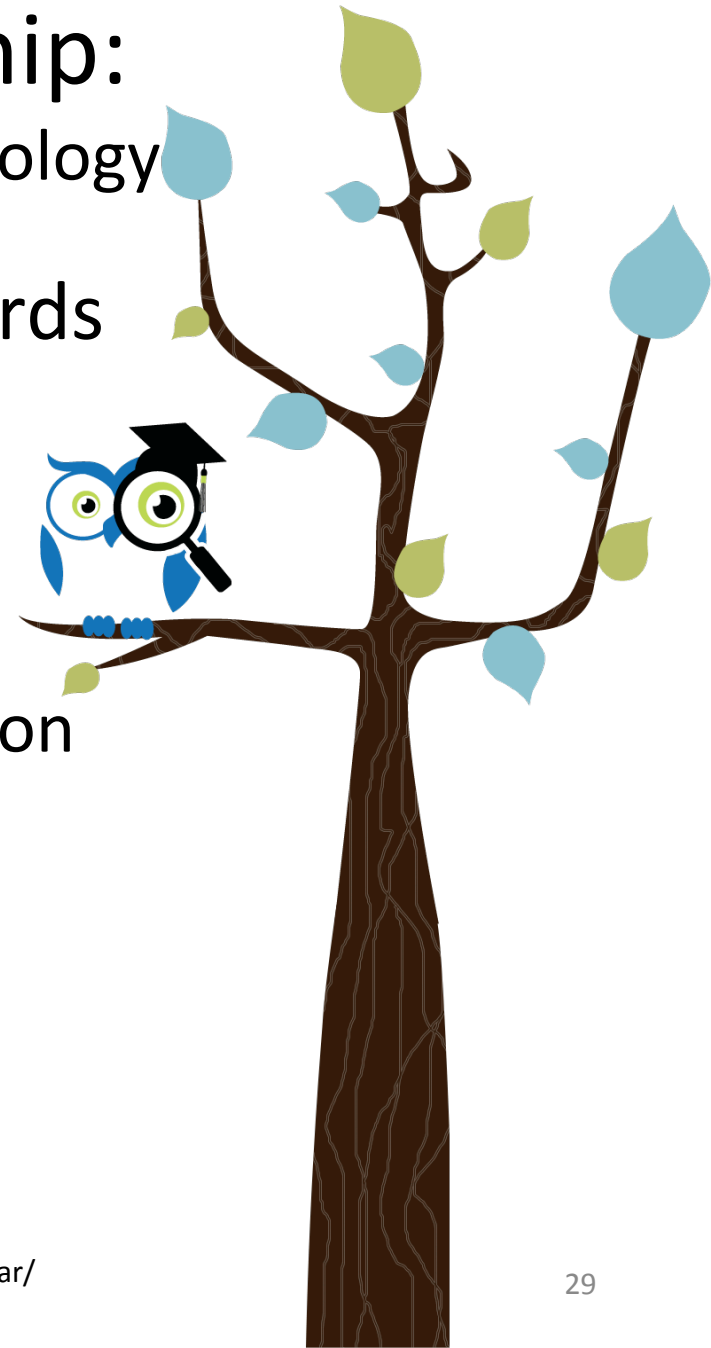
Data Scholarship: Chinese Buddhist Philology

- Models
 - Dissemination of texts as “meritorious acts”
 - Texts are versions, not originals
 - Form and content evolved over time
- Theories
 - Claims about origins of texts
 - Claims about relationships between texts



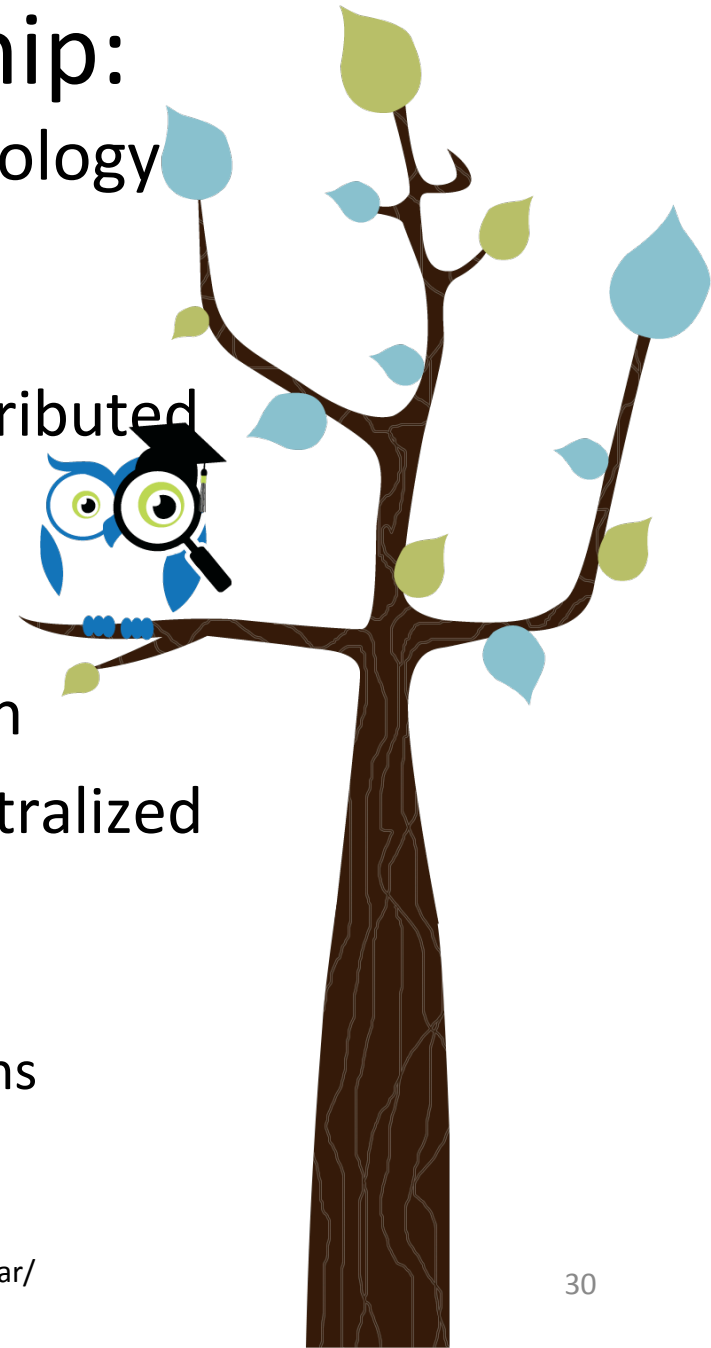
Data Scholarship: Chinese Buddhist Philology

- Metadata, ontologies, standards
 - Technical standards for text encoding and markup
 - Collection-specific metadata
 - Local practices for data collection and management



Data Scholarship: Chinese Buddhist Philology

- Knowledge Infrastructure
 - Data sources are diverse and distributed
 - Technical resources are minimal
 - Standards are generic
 - Informal scholarly communication
 - Sustainability of content is decentralized
 - Personal data management
 - Religious communities
 - Libraries, archives, private collections



Sustaining value in scholarship

- Invest in your data early and often
- Capture data in portable formats
- Migrate data as technology evolves
- Build community
 - Collections and data
 - Tools and expertise
 - Mechanisms for sharing and reuse
- Build archives and repositories
- Reuse, recombine, rethink



Data Stewardship





Peter Darch



Christine Borgman



Ashley Sands



Irene Paschetto

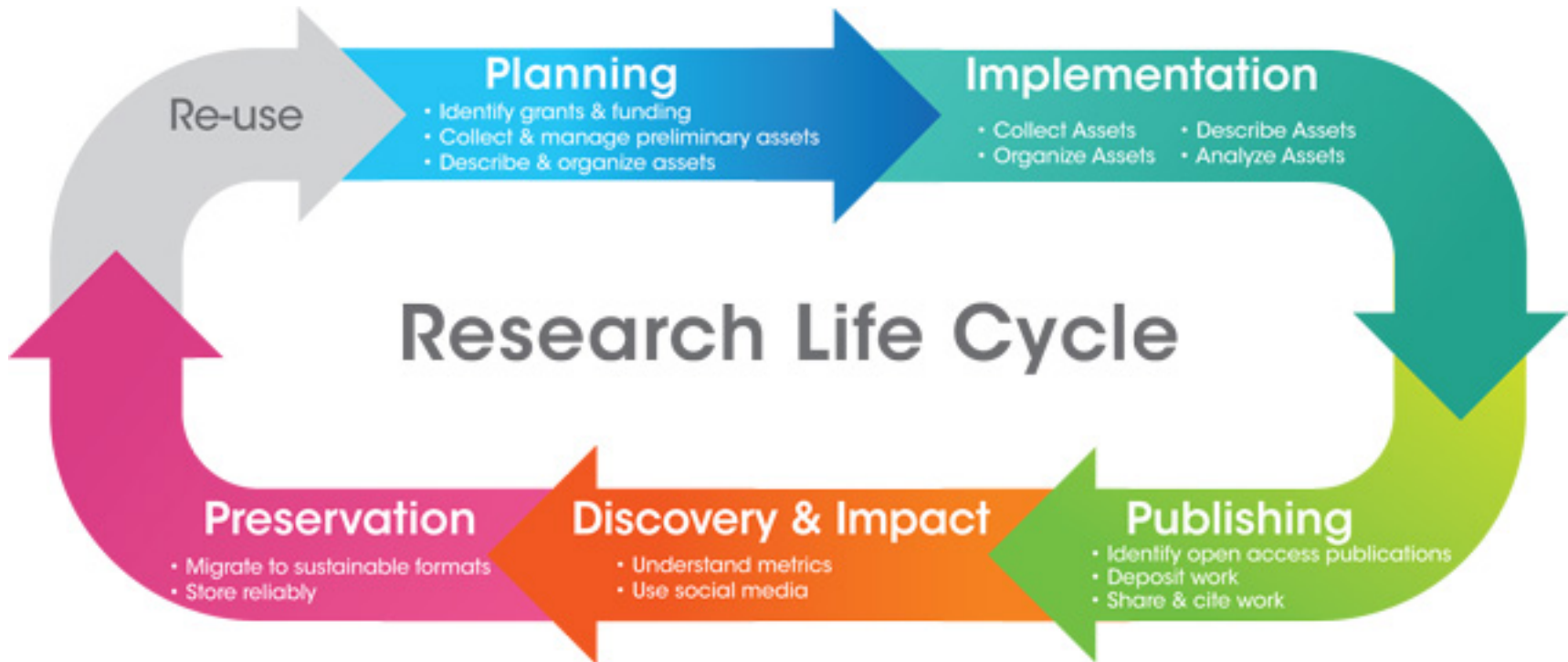


Bernie Randles



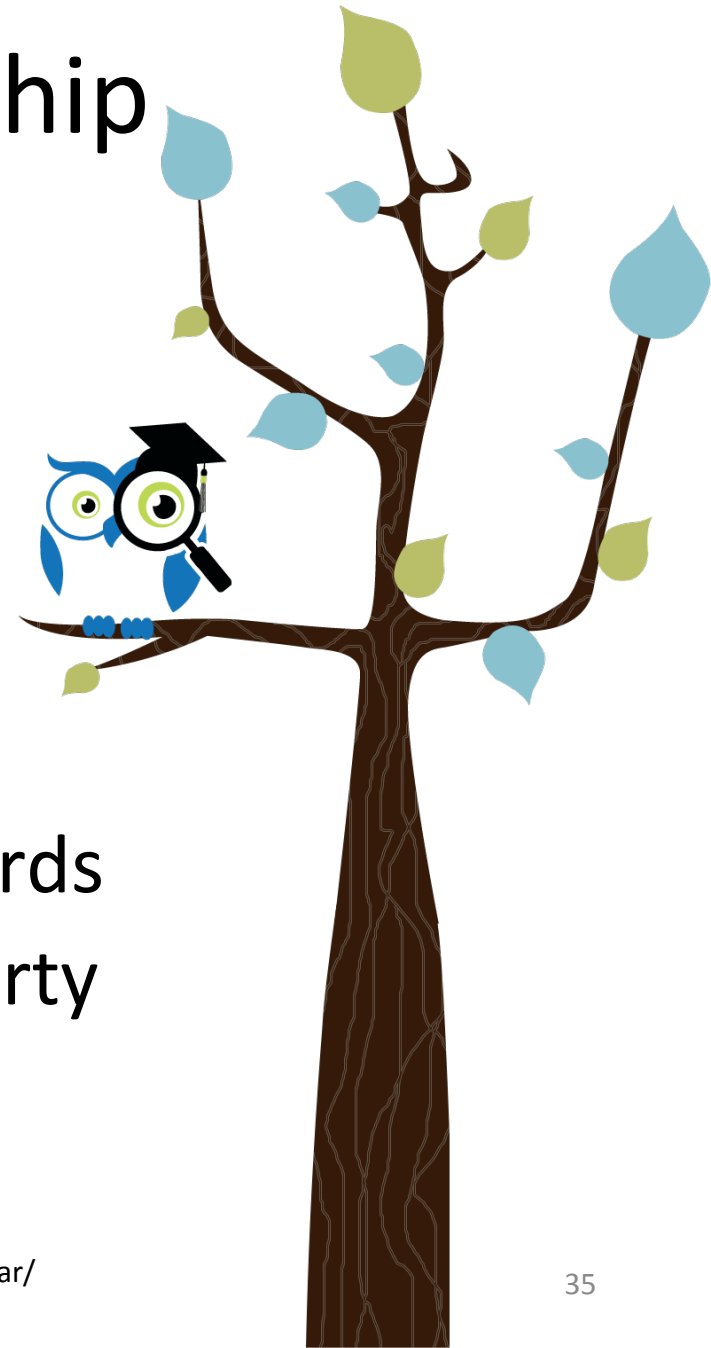
Milena Golshan

When to invest in data?



Data Scholarship

- Data types and sources
- Models and theory
- Community practices
- Scaling factors
- Temporal factors
- Metadata, ontologies, standards
- Economics, intellectual property
- Knowledge Infrastructure



If Data Sharing is the Answer, What is the Question?

1. How do **disciplinary configurations** influence the collection, use, and reuse of data and vice versa?
2. What **scale factors**, such as data, discipline, distribution, and duration, influence data practices, and how?
3. How does the degree of **centrality of data collection** influence use, reuse, curation, and project strategy and vice versa?



UCLA

Grant from Alfred P. Sloan Foundation to UCLA, Christine L. Borgman, PI, Center for Knowledge Infrastructures, 2015-2018

Studying Data Practices

- Ethnography
 - Observing activities on site
 - Embedded for days or months at a time
- Interviews
 - Questions based on our research themes
 - Compare multiple sites over time
- Document analysis
 - Public and private documents and artifacts
 - Official and unofficial versions of scientific practice

