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A Cautionary Note Regarding Indigenous Culture and Internet Search Technology

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In 2005, Navajo President Joe Shirley, Jr. made an address to the World Summit of the Information Society calling for greater indigenous participation in the Internet, with universal indigenous connectivity to assert indigenous "values, languages, traditions, and sovereignty."[1] Shirley's statement reflects a sentiment to use the Internet's capacity for streaming audiovisual multimedia and its interactivity as tools to empower indigenous peoples, providing a means of communicating, practicing, and storing indigenous knowledge and traditions. Such features are useful not only as an alternative means of social interaction, but also as a means of enhancing indigenous self-determination in the burgeoning realm of cyberspace. They are particularly useful for indigenous communities whose members are migrating to geographically distant locations, allowing departed migrants to maintain connections with their communities of origin and thereby help sustain their sense of identity.

I argue, however, that such aspirations should be pursued with caution, as Internet technology is associated with risks and nuances that users must understand in order to use it effectively. In particular, a form of Internet technology called *personal Internet search* provides a customized slate of search results tailored to the demographic profile and online behavior of each user: different users will see different search results even though they may be using the same search term. More traditional Internet search technology provides all users employing the same search term a standard list of search results. Personal Internet search, which is designed to help netizens navigate and locate links and content relevant to their personal interests, is being utilized by corporations

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such as Google and Yahoo!, which see it as helping users navigate the growing expanse of information, applications, and content in cyberspace.[2]

Eli Pariser sees personal Internet search as problematic for any group using the Internet as a means of discourse that addresses problems common to all group members. Pariser posits that personal Internet search isolates users in individual "filter bubbles" with personal views of reality, making it difficult for people of contrasting views to connect in cyberspace and engage in debates.[3] Pariser fears that ultimately this will exacerbate divisions between people to a degree that fractures the public discourse necessary for a society to address issues of common concern. Drawing upon Pariser's work, my concern is that for indigenous communities these arguments pose troubling implications. To the extent that culture is a discourse of common concern among the members of an indigenous group, personal Internet search risks fractionalizing such a discourse. As a result, indigenous communities looking to the Internet as a tool for cultural survival—particularly those communities whose members have migrated and use the Internet as a major mode of communication with home—will find a very different result using personal Internet search. The point of my analysis is to identify personal search as a nuance of Internet technology that indigenous peoples will need to address in order to ensure, in Joe Shirley's words, it is a place for indigenous "values, languages, traditions, and sovereignty."

DEFINITIONS

Culture has many different scholarly definitions, but for purposes of this discussion culture accommodates E. B. Tylor's basic components of "knowledge, belief, art, morals, law, custom" learned or socialized by members of a group, such that the group is a "community" sharing a culture.[4] Culture is not constrained by linguistic or kinship affiliations, but rather by shared norms and ideas, and is seen as fluid and dynamic.[5] Moreover, culture is taken as a practice conducted by its members individually and collectively with each other, such that their actions constitute expressions to maintain culture.[6] Given its abstract nature, culture is also taken as capable of existing independent of location. In particular, for situations involving activities of humans in cyberspace, this paper follows Manuel Castells' conception of culture as a phenomenon that can exist in the Internet, a space capable of accommodating multiple cultures independent of a fixed specific geographic location or political territory.[7]

It is recognized that each collective of human beings who self-identify as an "indigenous group" may host many different cultures (due, for example, to age, gender, etc.). However, directing attention to the idea of culture that helps to comprise an indigenous group's identity as distinguished from other indigenous people, I focus my discussion on the elements that each collective uses to self-identify as a distinct indigenous group, a collective of human beings that self-identify as (1) indigenous and (2) sharing a culture of common "knowledge, belief, art, morals, law, custom" seen by the collective as integral to their group's unique identity. In addition, "indigenous group" is not necessarily tied to land, since it is a product of self-identification, meaning members can choose whether their identity is tied to land or not. However,

the term *indigenous community* is taken as the segment of an indigenous group residing in a particular geographic location. Even though an indigenous group may witness the departure of individual members away from the community—for example, as in the case of the Mayan communities of Guatemala whose members migrated to the United States—those migrants are still seen as sharing an identity with their communities of origin as an indigenous group so long as both the migrants and those communities self-identify a shared unique identity with a self-described culture of "knowledge, belief, art, morals, law, custom."[8]

Indigenous Adaptation of the Internet

Indigenous experiences with the Internet occur within the context of a larger debate about the impacts of the Internet within indigenous lives. As described by a UNESCO policy brief, the Internet is a "two-edged sword" that can be used to mitigate or exacerbate the "erosion of indigenous culture and knowledge."[9] Proponents see it as supporting self-determination and cultural empowerment, while critics see it as posing risks to indigenous societies.[10]

Proponents include Navajo President Joe Shirley, Jr., who sees the Internet as a means for indigenous peoples to defend indigenous "values, languages, traditions, and sovereignty."[11] Shirley's view reflects a larger transnational indigenous movement to appropriate the Internet as a tool to counter the larger deleterious effects of globalization upon indigenous peoples.[12] For proponents within this movement, the Internet offers a decentralized network structure within which marginalized groups are able to engage and access a global array of actors and resources that bypass historical imperialist structures of exclusion and subordination. They also see the Internet as helping with the preservation and promotion of culture through audiovisual communications and data storage technology which support the practice and archiving of traditions.[13] Furthermore, since features of the Internet allow migrants to maintain social interactions with their communities of origin and thereby help them to sustain a sense of shared identity,[14] supporters see the Internet as particularly useful for indigenous groups whose communities have experienced a migration of members away to geographically distant locations—for example, the Maya from Guatemala,[15] the Mixtecs from Mexico,[16] the Quichua from Ecuador,[17] and Melanesians and Polynesians from the Pacific Islands.[18]

These qualities are seen as increasingly relevant as levels of dislocation continue to rise, with indigenous youth following larger global trends of migration towards urban centers for economic opportunities. For example, Canada's 2006 Census found that more than half of those who identified themselves as "Aboriginal" reside in cities, an increase of 50 percent from studies made ten years prior.[19] There are similar trends in the United States, Latin America, and Australia, where the majority of indigenous peoples now live in urban areas.[20] Living within non-indigenous environments may cause such migrants to become disconnected from the cultural life of their original communities. For these indigenous groups, this results in an erosion of the social interactions between group members that sustain a shared culture that comprises

their collective identity. The Internet's audiovisual communications and data storage technology can help migrants maintain connections with their home communities, countering this erosion.[21]

In contrast, critics charge that the Internet has been used to misrepresent and misappropriate indigenous culture; create a "digital divide" within indigenous communities between those who are Internet-enabled and Internet-literate and those who are not; and cause non-indigenous influences to further penetrate indigenous lifestyles.[22] Arguing that a corresponding process of westernization accompany such complications, scholars such as Jack Goody and Walter Ong assert that the Internet is based on Western didactic modes of conveying information and so discourage the deeper, more complex, and culturally grounded modes of contextual and experiential learning typical of indigenous cultures.[23] Likewise, C. A. Bowers argues that because the Internet is a product of an English-speaking society, it is based on metaphors and meanings specific to Western cultures. Thus, indigenous people using the Internet must adapt to a Western cultural context and in doing so, act to extend historical colonial policies that subordinated indigenous perspectives.[24]

I situate my analysis as a cautionary note within this debate, with the goal of highlighting a particular risk associated with personal Internet search technology that should be mitigated by those seeking to use the Internet to support indigenous cultures. Firstly, proponents' arguments are predicated on an assumption that an indigenous person can use the Internet to find and interact with other indigenous people. I argue that while this assumption is perhaps true for impersonal Internet search, it is not true for personal Internet search. I also assert that under personal Internet search the discourses within a group tend to become fractionalized, suggesting that in terms of group unity, the Internet may not deserve the hopes of proponents who see it as a beneficial tool for cultural survival.

Personal Internet Search versus Impersonal Internet Search

Conceptually, typical Internet search differs from personal search. Typical Internet search engines employ several different proprietary methods of producing lists of links in response to user queries. For example, software can actively seek out URLs and an algorithm that ranks search results for the user; a search engine database can accept URL entries from customers and then rank search results according to the visitor popularity of each URL's website; customers can pay to register a URL in a search engine listing that ranks the URL in search results by payment amount; or a search engine may use a combination of these various approaches. These categories of search engines are "impersonal" in that they present to every user a selection of URLs based on factors other than user characteristics. In contrast, personal Internet search utilizes algorithms with a search formula weighted according to user preferences: based on a user's profile and past online behavior, search result rankings produce a selection of URLs unique to the individual user.

Pariser finds personal Internet search troubling for society, contending that by providing each user a customized perspective, personal Internet search isolates users

inside individual "filter bubbles," such that different users come to hold different views of reality.[25] Pariser references Robert Putnam's "bowling alone" concept, in which "connections among individuals— social networks and the norms of reciprocity and trustworthiness that arise from them" build vitally necessary social capital.[26] Further citing Jurgen Habermas' conception of a public sphere where individuals interact to identify and address common concerns, Pariser argues that personal search erodes

Doogle

US election 2012

User "Barry"	User "Mitty"
Search Results:	Search Results:
Obama lead in polls	Romney vote recount
Obama convincing win	Voter fraud
Obama set for 2nd term	Voting controversy

FIGURE 1. *Example of personal Internet search. Searching the term "US election 2012," two users, "Barry" and "Mitty," receive different individually customized search results. Pariser posits that personal search provides different users with different perspectives of reality. Illustration by the author.*

social capital and weakens discourse crucial to the public sphere by making it harder for individuals of diverse backgrounds to identify common problems and generate common solutions. In other words, because filter bubbles will only allow users to locate other users if they share common perspectives, Pariser views filter bubbles as eroding social capital, social networks, and public discourse.

For studies involving public discourse and shared issues, Pariser's work is provocative. It is, however, directed at a popular audience, and so from an academic perspective is better understood if viewed in terms of relevant theory in the social network literature encompassing notions of social capital and the public sphere. Social network literature conceives of networks as being social interactions constituting ties between actors.[27] To the extent that cyberspace hosts such interactions, computer networks serve as conduits for social networks.[28] Social network analysis views networks as comprised of actors connected by interactions, where each actor is a node and the interactions between nodes are the relationships that serve as conduits for the diffusion of material and nonmaterial resources, so that the assembly of nodes and interactions constitute a social structure that influences behavior.[29] Participation by actors in networks is voluntary, and hence different networks have unique patterns of interaction.[30] The substance of connections between nodes is reflected in the social capital inside the relationships between actors in a social network. The nature of social capital varies as a function of the types of people and the types of interactions between them.[31] Social capital serves to fulfill "bridging" and "bonding" functions, where "bridging" connects individuals in one network to those in other networks and "bonding" connects individuals within a single network to each other.[32] Networks can be "heterophilic," in that they contain nodes that are diverse in their viewpoints, or "homophilic," in that they contain nodes that are similar in viewpoints.[33]

These concepts allow us a more detailed view of Pariser's contentions regarding Internet users' relationships. Specifically, personal Internet search affects social capital in social networks on the Internet in two ways: first, it aids bonding, in that it enables ties between users with similar values and prevents ties between users with different values; and second, it impedes bridging, in that it makes it difficult for users to find
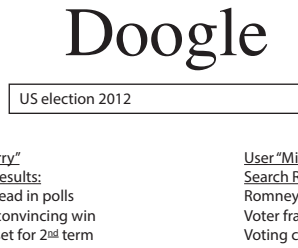
others with diverse viewpoints. Because actors with similar perspectives are more likely to find and associate with each other rather than actors with different perspectives, this facilitates the formation of homophilic networks with users holding the same values, rather than heterophilic networks with users holding diverse perspectives. The qualities of homophilia or heterophilia are important, since they differentiate the nature of discourse. Bonding functions not only to link actors with common values, but also to exclude those actors who do not share those values.[34] As a result, while a rise in homophilic networks may reflect increased bonding between actors with common viewpoints, it also reflects reduced bridging between actors with different viewpoints. Indeed, consistent with this, the scholarship finds that homophilic networks reinforce existing ideologies and so discourage diversity in viewpoints.[35]

The implications become more apparent when viewed on a scale of discourse that encompasses multiple networks of different viewpoints. An individual Internet network represents a community composed of strong or weak ties acting to bond actors with common values; in cases when actors joined the network either because they were directed by personal search results, or because they chose to follow their preferences from impersonal search results, this individual network is a self-contained homophilic environment, where a common view of personal search results constrains its actors into believing theirs is the only perspective of cyberspace. Lacking exposure to actors in other networks with alternative visions of the Internet, homophilic network actors will not only form ties only with others who share their viewpoints, but also tend to interact only with actors in their own network. This means the increase in bonding *within* homophilic networks brings with it a loss in bridging opportunities *between* different networks with different values.

Decreases in heterogeneous perspectives results in discourses with less knowledge and tolerance.[36] This makes it more difficult to generate consensus among different actors of differing preferences, since users in each homophilic network perceive a picture of reality unique to the network. Even if they do communicate with actors in other networks, they are less likely to recognize or accept their perspectives. Such changes suggest the rise of a cyberspace populated by disparate networks of hardened communities, producing an environment more polarized and less capable of consensus or coalition-building.[37] Although the Internet might still host a pluralist environment with a diversity of perspectives, nevertheless it would be harder for actors with differing preferences to form links. In an Internet environment of disparate homophilic networks that are constrained by bonding, hope for heterophilic discourse requires bridging between networks. Bridging can occur where any overlap in preferences between actors in different networks is sufficient to generate an overlap in Internet search results between them—an outcome more likely to occur with the standardized slate of links produced from impersonal search than with the unique slates produced from personal search.

PERSONAL INTERNET SEARCH AND INDIGENOUS CULTURE

Directing such insights from social network theory toward indigenous uses of the Internet reveals the implications of how personal search affects aspirations of using

the Internet as a tool to sustain indigenous cultures. To the extent that indigenous peoples' efforts to use the Internet involve individuals participating in cyberspace, these efforts can be interpreted as representing networks. While such networks conform to the structure of the overall Internet network, they are also social networks through which individuals locate each other to share ideas and information. Each Internet user acts as a node, with the interactions between nodes in cyberspace constituting social ties. Nodes that hold common norms, values, and worldviews—such as among members of a collective that identify themselves as an indigenous group—comprise a network reflecting that group's culture. The ties between members of the group would be bonding ties within the network; the ties extending outside members of the group would be bridging ties outside the network. Seen in this way, an indigenous group that appropriates the Internet to preserve and promote its own culture engages in a process of creating and maintaining networks of interaction in cyberspace between individuals who are comprising their collective identity. Individuals who are physically displaced from the geographic location of a particular indigenous group, such as urban migrants who may have become isolated from their original communities, need not suffer problems of cultural dislocation, but instead might use the Internet to find others in their own indigenous group and thereby retain practice of their group's culture.

As we have seen, such aspirations are more likely on an Internet that employs impersonal search because different members of an indigenous group exercising a search term to locate that group in cyberspace are presented with an identical slate of links so that they all then share a common slate of network ties specific to their group. This assures that regardless of possible dislocation, individuals will always be able to find other members in the particular indigenous group and form social networks to engage in the group's discourse of culture. In contrast, personal Internet search, tailored to personal preferences and behavior, presents individuals attempting to locate their group with customized search results—a slate of links unique to themselves. The absence of common links between users means ties between nodes are absent, which denies social networks, frustrates aspirations of using cyberspace for group cultural discourse, and exacerbates the isolation of individual indigenous migrants from their communities. For the group itself, this threatens group cohesion and erosion of its cultural discourse.

Although for Pariser the implications of personal Internet search apply to societies in general, concerns regarding the properties and attendant consequences of heterophilia and hemophilia within social networks are of particular relevance in discussions of indigenous peoples. A variety of scholars have observed that some indigenous groups see the Internet as a way of asserting their cultural identities against past centuries of colonial subordination and ongoing marginalization under imperialist patterns of globalization.[38] Given the legacies and consequences of past and current indigenous subjugation, this makes the question of indigenous uses of Internet technology—and hence the indigenous exercise of personal Internet search—an important issue.

Admittedly, it is possible that an indigenous group using personal search might be able to avoid disjunctures in its social network and instead adapt it to strengthen the group's cohesion. An individual using personal Internet search will find a slate of

Figure 2. *Hypothetical social networks under impersonal Internet search. Each different set of actors holds their own identifiable viewpoints. When all actors see the same search results, actors are able to interact with different viewpoints and the Internet becomes a broad social network comprised of many different actors sharing a heterogeneous discourse. Illustration by the author.*
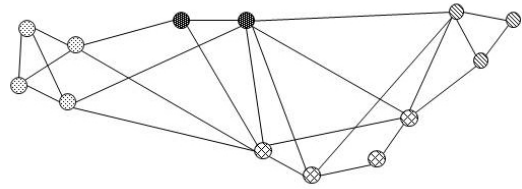
Figure 3. *Hypothetical social networks under personal Internet search. Absent common search results, it is harder for actors to interact with different viewpoints and hence network with those sharing their own viewpoints. The Internet becomes comprised of isolated social networks with each one left to its own homogenous discourse. Illustration by the author.*
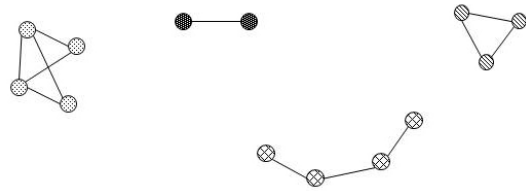
links that only allows ties to other users with similar preferences. Conceivably, this concentration of interests is more likely to occur among members of an indigenous group, since presumably as a collective they define themselves as sharing a culture of common knowledge, belief, art, morals, law, and custom that includes particular world-views espousing specific preferences. In other words, personal Internet search would yield results that parallel the group's culture.

Somewhat complicating this picture, scholars such as Cynthia Alexander and Judy Iseke-Barnes find that while an indigenous group may hold an identifiable culture specific to the group, its members hold individual identities and exercise personal interpretations of that culture.[39] Under the shared common results of impersonal search, these personal distinctions would be ameliorated: a standardized slate of links would act as ties connecting individuals even if they hold different interpretations of their group's culture. From a social network perspective, this represents a practice of a particular indigenous group's culture occurring upon a single common network that is a heterophilic environment encompassing diverse actors in the group. In other words, under impersonal search a particular indigenous group would experience only one social network in cyberspace hosting a single cultural discourse across all the group's diverse members. Under personal Internet search, however, differences in personal interpretations of culture would have no such amelioration because different users do not share common search results and thus common links would only occur between individual users who share the same interpretations of their group's culture. A group's culture would then be fractured, with the social network falling into multiple sub-networks that hold their own perspectives independent of other sub-networks or the

larger group. From a social network perspective, a particular indigenous group would experience a division in the social interactions of its members in cyberspace, such that the practice of culture would be divided between different homophilic sub-networks representing factions of their group.

In essence, the distinction between impersonal and personal Internet search to an indigenous group's culture can be summarized thus: under impersonal Internet search it is possible for a single group to share a common discourse hosted on a common network; under personal Internet search a single group instead will have different discourses occurring in different sub-networks. The former would be more heterophilic, and hence inclusive; the latter would be comprised of more homophilic discourses, and hence more exclusive. This is troubling, since the consequences of the differences between impersonal and personal Internet search are not limited to the issues of network formations and disjunctures: the literature on social networks in cyberspace also suggests that there are consequences with respect to the nature of discourse itself.

Under impersonal search, a particular indigenous group is able to create a common social network among all of its members, and hence can accommodate a discourse encompassing the diverse viewpoints across those members. Scholars such as Robert Putnam and Weiwu Zhang find that such heterophilic discourses tend to be inclusive and conducive to building consensus—qualities useful to an indigenous group seeking to maintain cultural cohesion against the challenges of globalization.[40] Under personal search, in contrast, an indigenous group is susceptible to the formation of separate, disconnected sub-networks. Because each sub-network is an isolated assembly of individuals sharing common viewpoints, the discourse within them is homophilic. For the larger group, this means an environment of independent, isolated, homophilic sub-networks. Roger Patulny, Robert Putnam, Gunnar Svendsen, and Weiwu Zhang observe that homophilic discourses tend to be insular, intolerant, and exclusionary, which implies that an indigenous group that attempts to bridge its sub-networks would find that its discourse would be polarizing, antagonistic, and contested—conditions contrary to aspirations of cultural cohesion and conducive to cultural dissolution.[41]

Of course, variations in indigenous identity and internal conflict have been known and observed offline in the past. But historically, indigenous groups were able to mitigate these forces since they were offline communities tied to geographic lands and places.[42] Each indigenous group usually had both a physically identifiable source of reference and leadership regarding identity and culture and a physically proximate community sufficient to facilitate discourse amongst the diverse members of the group that was in contact with group leaders regarding identity and culture. In terms of social network theory, the discourse in these historical networks was heterophilic, and hence inclusive and consensus-oriented. Under these past conditions an indigenous group was able to maintain a common network connecting individuals in the group, even when those individuals had differing interpretations of what comprised their shared culture and their group's identity.

It is not clear to what extent maintaining such a common network might be possible in the current era of physical dislocation. As many indigenous groups find

themselves dispersing, with members migrating away from historical geographically centered communities to urban areas, this physical dislocation drives separation from historical centers of indigenous cultural discourse. In these conditions, the Internet increasingly becomes the prime basis of social interaction, making the nature of Internet networks more significant in defining the character of an indigenous group whose members identify their collective identity in terms of common knowledge, belief, art, morals, law, and custom. Personal Internet search can foster a breakdown of a group's discourse into separate homophilic networks, with each one exhibiting insularity, exclusion, and intolerance toward each other. This leaves indigenous groups vulnerable to a loss of social interaction between dislocated diverse members, and thereby more susceptible to forces of cultural erosion.

Mitigating the Implications of Personal Search

It should be noted that impersonal Internet search can be used to produce the same homophilic outcome as personal Internet search. Internet users tend to forgo the Internet's opportunities for broad interaction and instead associate with others holding similar ideologies; thus, using the Internet neither necessarily erodes social networks nor automatically builds social capital.[43] Nonetheless, solutions that mitigate the effects of personal search can be found by pursuing further understanding of Internet search. Nuances that differentiate impersonal from personal searches indicate some appropriate strategies to counter the impacts of personal search upon cultural practice.

It is helpful to distinguish between impersonal and personal Internet search by attending to the nature of the ties represented by the links listed in search results. Social network theory categorizes the interactions that constitute the connections between individuals as "strong," "weak," and "latent" ties. Strong ties involve greater intimacy, more frequent communication, and greater exchange of information. Weak ties involve more casual relationships with less intimacy, less frequent communication, and less sharing of information.[44] Latent ties represent avenues of interaction that actors choose not to exercise but which, if activated, can become either strong or weak ties.[45] In generating lists of links in response to user queries, Internet search can be interpreted as offering lists of latent ties in that they are connections between people which are technically available, but are not activated in the sense of initiating social interactions between otherwise unconnected nodes.[46] Individuals, however, can select links that lead to other nodes in the network, and so can choose which latent ties will be activated to become strong or weak ties.

The nature of latent ties is the key in distinguishing impersonal from personal Internet search. When users of impersonal search share a common slate of links, they have the same opportunities to choose which links to activate and which to leave latent. Users may choose search result links in accordance with their own values, meaning that they fulfill bonding functions with others who share their viewpoints. But nonetheless, impersonal search users are also confronted with links to potentially alternative viewpoints with values different from their own, allowing for possible bridging functions. Such links act as latent connections to diversity, providing the user

with the opportunity to establish strong or weak ties with different perspectives. Even with homophilic networks, under impersonal search the Internet can be interpreted as retaining a potential to foster open, accessible, pluralistic discourse. In contrast, under personal search, a user is only able to see a selection of links that matches the user's viewpoints, so the restricted set of search results limits the ties that users can choose to exercise. Without such links, a user does not have latent connections to diversity or the opportunity to form strong or weak ties with different viewpoints.

Hence, the issue is not homophilic networks—both personal and impersonal Internet searches generate these networks overall—but that impersonal search allows a user to choose to pursue links tending toward diversified, or heterophilic, discourse, while personal Internet search does not. The consequences are a matter of degree: the lack of choice in personal searches means a greater likelihood of a polarized Internet comprised of disparate insular networks representing communities whose individuals exhibit less capacity for consensus or coalition-building, less knowledge, and less tolerance for viewpoints different from their own.

In that the attention to choice raises concepts of both agency and structure, this insight proffers guidance for solutions on how to mitigate the threat that personal search poses when using the Internet to further cultural discourse and practice. Internet users are agents with the power of agency to decide if they will pursue the opportunities provided by the Internet.[47] Impersonal search can be seen as more accommodating to user agency relative to personal search because, in essence, a user's experience is structured more by personal search than by impersonal search. The relationship of agency and structure, however, involves reflexivity: the ability of actors to have knowledge of their own behavior and the factors influencing their behavior. As a result, although structure may limit agency, actors can claim a capacity to understand and thereby influence the structures around themselves.[48] Actors may be directed towards certain behaviors—such as by the limited search results under personal search—yet they can still exercise a certain measure of awareness about the constraints directing them and their capacity to respond and change the structural forces responsible for doing so. This suggests that pursuing strategies that encourage reflexivity among Internet users can heighten the capabilities of agency to counter the impacts of personal search. For indigenous peoples using cyberspace networks to conduct discourses of cultural practice, reflexivity would be instituted by raising users' awareness of how their cultural discourses are affected by personal search technology.

Conclusion

Encouraging this form of Internet reflexivity goes beyond deploying information communications technologies and training in related technical skills among indigenous peoples to create an additional demand. It calls for additional education that specifically addresses the relationship between Internet technology and social dynamics, one that is transparent about the nature of the technology and its use among a population. In keeping with the idea of agency and structure, inculcating reflexivity in adopting

the Internet involves a dual demand for both indigenous peoples and ICT providers. Indigenous populations should seek education about the role of cyberspace as a mechanism of cultural practice in structural terms: that cyberspace fosters technological determinism, directing user behavior, but can also function as a tool that supports user agency. Conceivably, given indigenous peoples' orientation toward consensus and their aspirations to use the Internet to sustain their communal cultures,[49] such education might take the form of group discourse with the goal of ascertaining how the Internet affects their cultural discourse—not only in terms of how the Internet may influence cultural practices, but more particularly, how the group's culture may call for adjustments in Internet use. On the part of ICT providers, reflexive education calls for Internet technology that discloses its functioning so that users are made sufficiently aware of how personal Internet search can function as a structure to constrain user perceptions and options. More specifically, such a reflexive Internet technology should disclose the potential for hemophilia and the risk that such cyberspace environments may fractionalize discourses and thereby damage an indigenous group that turns to it as a way of aiding cultural survival.

This warning disclosure would assist in mitigating such dangers by raising awareness, particularly among those proponents who believe that the Internet is a positive tool that can only aid the survival of an indigenous group's culture. Encouraging Internet policies that support greater user agency against the structural presence of personal search enables more reflexivity among the individuals within an indigenous group as they employ the Internet to sustain their group's collective cultural identity.

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