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Wittgensteinian Support for Domain Analysis in Classification

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Abstract

Hjorland contends that in order to further the goal of linking researchers to relevant information 'domain analysis' should be used in concept classification. He thinks that concept classification should not strive to classify on the basis of the properties of objects, but rather on descriptions of objects that are loosely derived from human activity and social negotiation. Currently, most information scientists operate under a 'positivist' view of concept classification, which, Hjorland maintains, mistakenly strives for universal classification schema while muddling the comprehension of individual researchers.

Though he tends to include Wittgenstein in the positivist camp for classification, Hjorland's domain analysis is strongly Wittgensteinian. This work seeks to support the philosophical underpinnings of domain analysis through Wittgenstein's theory of language. Additionally, we outline Rick Szostak's criticism of domain analysis. While he levies an important charge against Hjorland, his solution proves inadequate in light of Wittgenstein's theory of language.

Introduction

Information science is in the business of connecting researchers with relevant information. Of key importance for this objective is the development of classification schemes and associated information retrieval (IR) systems, such as databases, catalogues, and the like. Classification, as defined by Hjorland, is the "sorting of objects based on some criteria selected among the properties of the classified objects" (2005, p. 592). In conjunction with classification schemes, IR systems serve as a kind of bridge between users and the classification of the materials for which they are searching.

Classifications, then, should be evaluated on their ability to support effective IR systems; where 'effective' is defined as the maximization of both precision and recall of materials in response to user queries. In other words, when a user enters a query in an IR system, an effective system will present him or her with all of the relevant records, and only the relevant records.

Those with a good deal of research experience will no doubt notice that this is rarely the case. Hjorland recognizes this and in response suggests that information scientists should embrace a theory of concepts

as socially negotiated and contextualized by user objectives and knowledge domains. Armed with such a theory of concepts, Hjorland recommends “domain analysis” as a new research program for the development of more effective classification schemes and associated IR systems (1995).

Hjorland’s view of concepts and the appropriate development of classifications is strongly Wittgensteinian. An analysis of Wittgenstein’s view of the development of language, language games, and family resemblance shows that his philosophy strongly supports, or is at least sympathetic to, Hjorland’s theory of classification. This is not to say, however, that Hjorland’s theory is not without important criticisms. Rick Szostak, for example, challenges Hjorland’s view on the grounds that it will make interdisciplinary research more challenging, perhaps even prohibitively so.

Given the importance of interdisciplinary scholarship, this is certainly a valid concern. And while Hjorland may be without a meaningful response to Szostak’s criticism, he might conscribe Wittgenstein for a bit of help. This paper will argue that Wittgenstein’s emphasis on family resemblance concepts, and his understanding of the meaning of words being derived from their use, renders Szostak’s criticism invalid while providing a framework for further research to support interdisciplinary research within the domain analysis framework.

Hjorland’s Concept Theory and Theory of Classification

Concepts are ubiquitous in information science. Not only do they provide the raw materials for classifications, but they are employed by users in their queries and by information intermediaries. If the goal of information retrieval systems is to maximize both precision and recall, then a solid understanding of the concepts employed by researchers in various knowledge domains is of the utmost importance.

Hjorland (2005) starts by taking the position that classification systems are, fundamentally, systems that organize concepts and their semantic relations. As such, different theories of concepts will promote the development of different classification schemes. Given the key role of classification schemes for information science, then, it is apparent that the theory of concepts adhered to by information scientists is of great importance to the field. However, the study of concepts is highly interdisciplinary. Philosophers, psychologists, linguists, sociologists, etc. are concerned with the nature and function of concepts explicitly, while potentially all disciplines are implicitly concerned with the nature of the concepts they employ. Additionally, many of these fields have developed divergent understandings of the development and function of concepts. This causes trouble for the information scientist. In Hjorland’s view, not all theories of concepts are equal in terms of the classification schemes they promote. He hopes to show that the theory of concepts derived from the ‘activity theory’ perspective is of the most pragmatic value for information science.

Hjorland (2009) begins by noting that a theory of concepts that he calls ‘positivist’ has thus far dominated information science. By a ‘positivist’ understanding of concepts, he means “the ideal that scientists should only be concerned with the ‘facts’, that they should keep to observations, logical deductions, and formal models” in their examination of concepts (p. 1520). For classification schemes, this means that observations or, presumably, concepts, are not contextualized within a given theory or knowledge domain. Moreover, concepts are taken to be facts about objects and should be classified based on strict logical rules, which are discoverable through investigating the computer-like processes of the human brain. Based on the above, concept classification schema developed under the positivist model should also be universal in nature, implying that there are ‘right’ and ‘wrong’ ways to classify concepts.

Hjorland criticizes the positivist account first on the ground that it does not take the theory-dependence of observations into consideration. Citing Thomas Kuhn, Albert Einstein, Karl Popper, and others, Hjorland (2005) legitimately claims to be in good company on the issue of observations as theory-dependent. He laments the fact, though, that the information science community has largely ignored the notion of observations as theory-dependent. In response, he hopes to show that concepts should be contextualized in knowledge-domains and that we should develop classifications accordingly. He calls

this a ‘pragmatic’ viewpoint insofar as concepts “should be defined in relation to the work we want them to perform for us” (Hjorland, 2009, p.1520).

But what exactly is the function of a concept? Hjorland (2009) notes that concepts have stability, linguistic, metaphysical, and epistemological functions. He focuses on the stability function, as interpreted through an activity theory framework. This framework, developed loosely out of pragmatism, suggests that “our concepts are stabilized by the standard practices that they serve within a community” (p. 1522). This implies that “to learn the meaning of the objects [I.E. concepts] is not just about establishing a connection between objects and signs…but instead to understand the co-evolution between objects and human practice” (p. 1522).

To elaborate, Hjorland takes the view that concepts are like tools, in that they are developed to think about and communicate within various modes of social organization. This is loosely derived from William James’ pragmatic position that concepts serve to classify the world according to private ends (Hjorland, 2009). The activity theory perspective, though, differs in seeing concepts developed for social—defined broadly or narrowly—ends. This is in stark contrast to the positivist view, which sees concepts as facts corresponding to objects. Hjorland’s activity theory sees concepts as descriptions of properties of objects. In his view, these descriptions are both theory-dependent, and developed through a process of discourse within a social group or knowledge domain (Hjorland, 2005).

As a consequence of this view, concepts may change over time, as well as carry different meanings across some social groups or knowledge domains. Thus, the stabilizing function of concepts, with which Hjorland is concerned, extends only to the social group or knowledge domain, within which the concept is negotiated. To elaborate, we might consider the classification of a tomato. Much disagreement takes place over whether a tomato should be considered a fruit or vegetable. In Hjorland’s view, the relevant aspects of a tomato should be classified according to the objectives of a given social group or knowledge domain. Thus, it is legitimate for a legal classification scheme to classify a tomato as a vegetable if it has been socially negotiated, via legal definition, as such. The converse is true of classifying a tomato as a fruit under a scientific classification scheme.

In short, concepts are taken by Hjorland and other activity theorists to be “dynamically constructed and collectively negotiated meanings that classify the world according to interests and theories” (Hjorland, 2009, p. 1522). If this is the case, then classifications should not be understood as classifying reality as such, but socially constructed descriptions of reality via the interests of social groups, or knowledge domains, and the respective theories they employ. With such a pragmatic viewpoint, Hjorland hopes to show that classifications founded on this theory of concepts are better suited to produce effective IR systems.

In 1970, influential information scientist Spärk Jones indicated that theories of classification have not been sufficiently examined in information science. Thirty-five years subsequent, Hjorland worries that this is still a problem (2005). In response to this issue, Hjorland hopes to criticize the positivist classification schemes while presenting his ‘domain analysis’ as a more fruitful alternative.

Hjorland notes that positivist classifications have, thus far, dominated information science. He thinks that this view is flawed in several respects. First, as discussed, he criticizes the positivist view on the conceptual ground that it does not recognize that our observations, or concepts for that matter, are theory-dependent. Second he maintains that the positivists imply that the classification of objects is based on properties of those objects. As we have seen here, Hjorland maintains that we are not classifying properties of objects but descriptions of them that are loosely derived from human activity and social negotiation. Or “the way we conceptualize an object depends on our pre-understanding, of our social-cultural background, of our domain-specific knowledge, and of our theoretical outlook” (Hjorland, 2005, p. 593). He does not make a sufficient philosophical argument for his position and against that of the positivist, but we will see that Wittgenstein might provide one for him.

Hjorland also criticizes the positivist view based on the type of classification it supports. As previously mentioned, the positivist view suggests that there is a 'best' or 'natural' classification scheme that is discoverable via some combination of empirical observation and investigation into the computer-like processes of the human mind. This view fails to take the user's objectives into consideration, which Hjorland thinks are omnipresent.

To elaborate, we may recall the tomato example outlined above, or, consider a simple illustration offered by Hjorland (2005). In the figure below, let the four figures represent a set of objects to be classified. Notice that there are two squares and two triangles, or, looked at another way, two white objects and two black objects. There is no 'best' or 'natural' way to classify these objects, instead they must be classified in accordance with user needs.

This prompts Hjorland to maintain that, "we have to base our classifications on knowledge about [user] purposes" (p. 585). Indeed, classification systems are not neutral tools, rather, they are always intended to support user needs. As such, they should be geared towards specific interests. In other words, we should not focus on the creation of universal classifications but on domain-specific classifications that consider the needs of users within that domain.

Furthermore, this would entail the investigation of not just the needs of users within a domain, but also the type of language those users employ. The words and concepts employed in different disciplines are rarely perfect synonyms, rendering universal classification problematic, even with the use of thesauri. So, Hjorland supports the development of domain-specific classifications based on the standardized practices, specific use of concepts, and the goals or objectives of the discourse community.

When information scientists fail to recognize the domains and discourse communities within which objects to be classified are contextualized, poor classifications are sure to result. In response, Hjorland maintains that information scientists charged with classification within a domain should have a solid understanding of the objectives of that domain, the language employed within the discourse community, and the different theoretical viewpoints within it. Such a domain analysis will promote the development of effective IR systems to better connect users with relevant information.

Wittgenstein's View of Language

Before sketching some of the aspects of Wittgenstein's philosophy that are relevant to this work, it is worth noting that Wittgenstein sees philosophy as an organism. He refers to "a book on philosophy, with a beginning and end, [as] a sort of contradiction" (AWL, 43). By this he means that philosophy is an ongoing process that cannot give us a 'general idea', or, to use a geography metaphor, a broad overview of a new land. Instead, Wittgenstein concerns himself with particularities or the connections between the roads on a map. Philosophy should be in the business of continually clarifying such particularities rather than attempting to create broad, over-arching theories.

With this in mind, it is perhaps best to proceed by investigating Wittgenstein's view of language as built on a particular case. Subsequently, we will examine his view of language games as rule-governed activities and his idea of family-resemblance concepts. Through this exposition we hope to gain an understanding

of Wittgenstein's view of concepts and language games, which may then be tied back to Hjorland's domain analysis.

Wittgenstein begins developing his picture of language, by critiquing the Augustinian view that "every word has a meaning. This meaning is correlated with the word and is the object for which the word stands" (PI ss. 1). This Augustinian view of language rests on ostensive definitions of words where an object is pointed to and a word pronounced, thus correlating the object with the meaning of the word. Wittgenstein contends that such a view applies only to a small segment of language and that it fails to explain the dynamic usage of normal, everyday language.

To illustrate, Wittgenstein draws our attention to what he calls "a complete primitive language" between a builder (A) and his assistant (B) (PI ss2). The language consists of the words 'block', 'pillar', 'slab', and 'beam'. When A shouts, "Slab!" B brings him a slab, and so on. Now, if an information seeker in an academic library were to shout: "Slab!" to an information intermediary, the latter would certainly be quite confused regarding the meaning of such a command. Wittgenstein's point, then, is to illustrate the importance of taking context, especially in the form of human activity, into consideration when trying to understand the meanings behind human utterances.

Wittgenstein certainly grants that ostensive definitions of words play a role in language, but the Augustinian picture that depends on such definitions exclusively can account for only a small part of language. In the above example, an ostensive definition of 'slab' may be all that is required for the primitive language that supports the activity in which A and B are engaged. However, as language increases in complexity, ostensively defining words becomes impossible. Indeed, Wittgenstein claims that an ostensive definition can be called only "a preparation for the use of a word" (PI ss 43).

The confusion displayed by the information intermediary above illustrates the lack of a fundamental connection between words and objects. If such a connection existed, then the command "slab!" would accurately convey meaning to the information intermediary. Wittgenstein maintains that words can be properly understood only in the context of a given language game. To understand Wittgenstein's picture of language games, though, it is necessary to begin with the importance he places on the *use* of words.

Wittgenstein sees language games primarily as rule-governed activities. He compares language to a game of chess, drawing a connection between words and chessmen. Consider the meaning of the king of chess: an understanding based strictly on the physical characteristics of the piece would be impoverished to be sure. For the piece to have a robust meaning, we must have an understanding of its potential moves in the game of chess broadly speaking, as well as its potential moves given its position on the board. Moreover, we do not learn to play chess merely by associating the names of the pieces with individual objects. Instead, to learn chess we must learn the potential moves of the chessmen.

Similarly, naming an object or concept via ostensive definition is "not yet a move in the language game any more than putting a piece in its place on the board is a move in chess" (PI ss 49). As a result, Wittgenstein says that we should not "talk about the meaning of words but rather about the *use* of words" (Italics mine, AWL 44). Ostensive definitions yield impoverished understandings of words and are not enough to give words meaning. We might suppose that we may gain an understanding of words through definitions, but this merely removes the problem one step, as it presupposes an understanding of the words in the definition. Instead, as with chess, in order to have a robust understanding of the meaning of a word, we must learn its potential moves within a language game. So the confusion of the information intermediary above is analogous to one's confusion over a chess opponent moving his rook diagonally.

Wittgenstein does note, though, that the rules of language games are not rigidly defined, but are more like human conventions that allow for a degree of flexibility. Language is more appropriately understood as a creative process in which participants may negotiate new 'moves' for words. Simply put, there can be no strict definitions for words, and "to suppose that there must be would be like supposing that when children play with a ball they play a game according to strict rules" (BB 116).

However, this is not to say that any use of a word within a language game will convey the intended meaning. Indeed, Wittgenstein claims that "the term 'language *game*' is meant to emphasize that the speaking of a language is part of an activity or a form of life" (PI ss 23). So, in order to understand which moves are legitimate within a given language game, we must understand the form of life within which it is embedded.

For Wittgenstein, forms of life are the summation of all of the linguistic and nonlinguistic activities in which humans engage. These serve as a type of socio-cultural landscape on which language games are played out. Turning our attention to the 'complete primitive language' of the builders above, their form of life might be seen as the activity of constructing a house. The language game of "slab!", "pillar!" etc., can only be understood when it is contextualized within their form of life—the activity of building. Thus, the meanings of words are directly tied to the mutual activities in which the speakers are engaged.

Notice, though, that Wittgenstein has failed to give an explicit definition of "language game." Indeed, he employs the terms in a wide variety of settings, from the builders above to the whole of language as a game. Wittgenstein thinks that there is no essential definition of concepts such as "language game," only an array of uses with a variety of overlapping similarities he terms "family resemblance."

To elaborate, Wittgenstein draws our attention to the word "game." Games come in many varieties: athletic games, board games, card games, etc. We may be inclined to think that there is an essential aspect that all games share, but Wittgenstein commands us: "Don't think, look!" (PI ss 66). In looking, we find similarities within the varieties of board games, athletic games, and card games, as well as similarities among these varieties of games. However, in so doing, we also find that "many common traits disappear, while others appear for the first time" (PI ss 66). We shall find no essential characteristic held by all games. Thus, games should be understood as holding various resemblances, some overlapping, others not, like the members of a family. Such family resemblances are not restricted to games, though. Indeed, investigation into a variety of concepts yields a multiplicity of resemblances through their characteristics and uses within a language game.

With this in mind, we find ourselves in a position to understand Wittgenstein's comparison between language and a city. He claims that:

> Our language can be regarded as an ancient city: a maze of little streets and squares, of old and new houses, of houses with extensions from various periods, and all of this surrounded by a multitude of new suburbs with straight and regular streets and uniform houses" (PI ss. 18).

Here, Wittgenstein is making the point that our everyday language, like an ancient city, is developed over time through human activity and the negotiation of new uses for words within a shared form of life. On this view, language is a messy business to be sure. Surrounding our everyday language, we find the "suburbs with straight and regular streets and uniform houses," which we might take to be various knowledge domains. These are seen as language games developed for specific purposes, which abide by stricter subsets of rules for the uses of the concepts employed.

Points of Contact with Hjorland

Based on their similar views on language and the meanings of concepts, it appears that Wittgenstein would support Hjorland's domain analysis. However, Wittgenstein may take a stronger position on the matter than Hjorland. The latter maintains that domain analysis should be adopted on the grounds that it will produce the most pragmatic classifications. Under Wittgenstein's view, though, exploring the language games of researchers in various domains should be the only—not simply the pragmatic-- way to develop classifications.

First, it is helpful to investigate some points of contact. Both Hjorland and Wittgenstein take a similar view of language as not being directly correlated with objects but rather as a socially negotiated phenomenon. This requires a revision of how we understand the meanings of concepts. Both focus on the *use* of language, Wittgenstein through language games and Hjorland through the seemingly equivalent process of social negotiation within knowledge domains.

Wittgenstein and Hjorland both seem to offer a similar critique of the positivist approach to language. Wittgenstein agrees with Hjorland that concepts are not derived from facts about objects, but that they are socially negotiated within the context of language games. Presumably then, Wittgenstein could also support the claim that observations and concepts are theory-dependent, insofar as the theory is taken to be one of the rules of the language game being played.

We can see, then, that Hjorland's call for domain analysis may be understood as a call to investigate the workings of the language games being played within various knowledge domains. Beyond the pragmatic reasons Hjorland notes, Wittgenstein might claim that such an investigation is the *only* way to develop classifications appropriately. Wittgenstein contends that the striving for generalization and essential meanings of words has led philosophy astray for thousands of years. We can easily imagine him saying the same for classifications. Our drive to universalize concepts on the basis of an essential meaning and classify them accordingly has largely yielded ineffective classifications. The only way to alleviate this is to heed the Wittgensteinian call to consider the particular usages of concepts in a language game and classify them according to their meanings in that context.

Szostak's Criticism

Szostak (2008) agrees with the spirit leading to Hjorland's mode of classification, but he worries that domain analysis may hamper interdisciplinary research. This criticism is an important one. We have seen that Hjorland thinks classifications should be developed with the user's objectives in mind, and they should be evaluated pragmatically on their ability to serve those objectives. If interdisciplinary research can be shown to be an important objective for scholarship at large, and Hjorland's domain analysis fails to meet the needs of interdisciplinary researchers, then domain analysis should be rejected on the basis of Hjorland's own pragmatic criteria.

Szostak grants that "the words used in different disciplines are never perfect synonyms" (2008, p. 321). So, thesauri cannot "flawlessly guide the scholar to relevant works in other disciplines" (p. 321). As a result, interdisciplinary researchers must use more time consuming methods of research, such as consulting colleagues in other disciplines. Moreover, the use of different language in different disciplines causes some research to go unnoticed because connections to other bodies of knowledge are not recognized. Szostak sees Hjorland's view as perpetuating such interdisciplinary research barriers.

He also maintains that "interdisciplinary scholarship characterizes the future of scholarship" due to the increasing complexity of social and environmental problems (2008, p. 323). Thus, interdisciplinary research will increase in importance insofar as it has the capacity to evaluate these types of problems from a multitude of perspectives. Indeed, it appears that interdisciplinary scholarship will increase in importance in proportion to a decrease in importance of strict disciplinary scholarship. As such, Szostak thinks that it is of great importance to develop classifications that facilitate such research. Doing so,

though, does not entail an outright rejection of Hjorland's work. Instead, Szostak seeks to complement the inductive work via the intradisciplinary negotiation of concepts espoused by Hjorland with a deductive approach that begins with universal concepts.

Hjorland maintains that information scientists cannot "extend the inductively derived classifications across disciplinary boundaries" (Szostak, 2008 p. 323). However, Szostak thinks that this is precisely what we must do in order to facilitate interdisciplinary research. To that end, he recommends the development of a classification system that is ordered *hierarchically* by phenomena and theories, as classified by key characteristics, *exclusively* via explicitly defined phenomena and *monothetic* where "phenomena are defined either in terms of their essence or function" (p. 323).

Phenomena, according to Szostak, should be classified on the basis of their level of complexity. These complex phenomena can then be disassembled into their constituent components to account for particular qualities. Theories should be classified according to key characteristics "such as type of agent posited, type of behavior explained, and the type of decision making process" (p. 324). With such a universal and exhaustive classification, interdisciplinary researchers should be able to search across disciplines for particular phenomena and the employment of various theories.

Such a classification should also dissolve the problems noted by Hjorland. However, it seems to fall short of this goal. Hjorland points to the issue of classifying "food" because some substances may be viewed as food in some cultures but not in others. Szostak maintains that "food" can be defined explicitly by "whether a substance affects the body physiologically when ingested" (p. 323). With this definition we may then draw links between "food" and cultural attitudes that "could then capture why a society distains a substance with nutritional qualities or applauds a substance with none" (p. 325).

This definition would fail to account for the totality of the uses of the word food. For example, "food" is often used to describe other types of nourishment, like food for the soul, or food for thought. This definition would also require vitamins to be classified as food. Clearly, such disagreements over definition may arise based on the worldview, or language game, within which the concept is used. Szostak fails, then, to adequately solve the key problem with which both domain analysis and the Wittgensteinian view of language are concerned.

Moreover, Szostak criticizes the idea that "the essence of phenomena will change over time" (p. 327). He grants that this may be the case for some phenomena, but it is not the norm. He challenges Hjorland's contention that the concept "financial institution" changes over time by claiming that it can be precisely defined "in terms of a specific set of functions" (p. 327). Notice, though, that there can be disciplinary disagreement over what qualifies as an 'institution' and the precise functions it serves. An economist, for example, may not recognize a loan shark or wealthy uncle as a financial institution, while a sociologist may be inclined to do so.

Szostak could respond by saying that we need to define financial institution as broadly as possible to account for these different varieties, however, if he does so, his classification scheme may fall victim to pragmatic concerns. If classifications and associated information retrieval systems are evaluated on their ability to effectively connect users with relevant information, then the likelihood of retrieving irrelevant information in response to user queries must be taken into consideration. Under Szostak's classification, an economist conducting disciplinary research might be overwhelmed by the amount of irrelevant information retrieved when researching financial institutions. Such an overload of information would certainly hamper discipline-specific research.

Additionally, we must ask ourselves, who determines the 'basic' constituent components of phenomena? Disciplinarians will certainly have varying understandings of 'basic.' For example, in disassembling the concept of 'food' a physicist might seek to understand the atomic structure of foods, while a nutritionist might see macro and micronutrients as the relevant constituent components.

So, it appears that Szostak's proposed theory of classification falls short on two counts. First, as mentioned above, it seems that it will create pragmatic concerns for disciplinary research. To be sure, Szostak focuses on the importance of interdisciplinary research. However, it seems likely that the social and environmental problems Szostak is concerned with will require collaborations between interdisciplinarians and strict disciplinarians in order to balance depth and breadth of study. Classifications that hamper the research of the latter certainly deserve consideration. Given Wittgenstein's view of family resemblance, categorizing phenomena on such a broad level will likely yield tremendous amounts of irrelevant information to disciplinary researchers, thus impeding their investigations.

Moreover, Szostak explicitly accepts the notion that words used across disciplinary boundaries will not be perfect synonyms, while he seeks to define phenomena according to their essential characteristics. This seems to follow the 'positivist' conception of language rejected by both Wittgenstein and Hjorland. Wittgenstein shows quite clearly that phenomena have no essential characteristics, only a variety of overlapping and distinct characteristics. Hjorland seems to agree with this view by suggesting that the only way to understand concepts or phenomena is through their use in a given discipline. In short, it appears that Szostak's affinity for essential characteristics and universal applicability have motivated the development of his classification system. However, in so doing he has fallen victim to precisely the motivation that Wittgenstein thinks has hampered philosophy for thousands of years.

Szostak, though, does accomplish the important work of bringing interdisciplinary concerns regarding domain analysis to light. Given the importance of interdisciplinary scholarship, these concerns should not be ignored. It seems, though, that rather than view these concerns as requiring a rejection of domain analysis, we should take them to be research problems within the Hjorland/Wittgenstein framework. Presumably, this might entail the creation of a complementary meta-classification system geared specifically to the needs of interdisciplinary researchers. Outlining such a classification is beyond the scope of this work, but we might imagine it to display several characteristics.

Rather than a hierarchical organization, which may be disputed across disciplines, we might see such a classification as existing as a sort of web that focuses on the semantic relationships between concepts. A visual display focusing on such connections could then emphasize both the family resemblances of concepts and their variety of uses across disciplines. This radical approach to classification could facilitate interdisciplinary research by allowing scholars to learn the rules of different language games by exploring the semantic relations between the concepts employed. Of course, more research in this area is necessary.

Conclusion

If information science is in the business of connecting researchers with relevant information, it should certainly concern itself with the philosophy of language. Hjorland has done just this. His domain analysis is strongly linked to Wittgenstein's view of language. Taking the social negotiation of concepts, as rooted in human practice, Hjorland proposes an exploration into the language games played by disciplinarians in hopes of developing pragmatic classifications. Szostak's criticisms, based on concerns for the implications of domain analysis for interdisciplinary research, are certainly warranted. While his theory of classification should be rejected on the grounds that it does not take Wittgenstein's view of language into consideration, we cannot easily reject his call to consider the needs and objectives of interdisciplinary researchers. Indeed, further research is needed to develop a mode of classification that considers the needs of interdisciplinary researchers, but this need not be done at the expense of Hjorland's domain analysis.

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