THREE ROLES OF METAPHOR ON THE INTERACTIVIST FRAMEWORK

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Abstract

Metaphor has been understood historically from the literary point of view (Ortony, 1993; 2-3). However, this paper understands metaphor as specialized system activities of the brain (Bickhard 1998) that is manifested at three levels of representation. The term 'role' is used to describe how it displays itself at each level of representation. Hence, it shall be proposed that three roles of metaphor underlie human cognitive processes: as a vehicle for categorisation, for comparison in illuminating understanding; and for creation of new knowledge. This paper sets out to argue for these three roles of metaphor. It is hoped that by redefining metaphor as system activities, this understanding will provide a 'natural' explanation of language and behaviour from biology specifically, that of neurobiology

1.0 Introduction

The study of metaphor should start with Aristotle (Ortony, 1993. 3). We are told that "Aristotle was interested in the relationship of metaphor to language and the role of metaphor in communication" (ibid.: 3). He believed that metaphor is comparative in nature based on the principles of analogy. Its use for Aristotle is, in the main, ornamental. In *Topica* we are told to be wary of metaphor because of its vagueness. It sometimes assumes the role of definition and due to this Aristotle suggested that a clear differentiation be done between metaphor and definition.

Some examples of the use of metaphor in language would be: 1) life is a box of chocolates, 2) life is like a wheel, 3) the brain is a computer; 4) time is

gold, and 5) men are wolves. Since these are considered as metaphors, linguists tend to look at them as 'beautiful language'. Simply, the examples above compare different objects from a domain of living, for example *life, the brain, time,* and *men* to another, for example, *a box of chocolates, wheel, computer, gold,* and *wolves.*

In cognitive science, metaphors are not just beautiful language but are connected to concepts in the brain. These concepts will eventually orient how we understand our world. For example, Lakoff (1990) describes how conceptual primitives based on the metaphor 'anger is heat' allow us to understand how we interact with objects in our world. The metaphor 'anger is heat' makes us understand what it means in sentences such as 'My blood is boiling', ' He blew his top', or 'I'm burning with hate'. Hence, metaphor is linked to the way we build concepts of our experience in the world.

This paper will also consider how metaphors are connected to the brain. It considers the framework of interactivism specifically, that representations in the brain arise out of interaction between the brain and the physical environment. Metaphor, from this framework is specialised brain activities. These metaphorical activities of the brain, this paper would argue, characterise all the phenomena related to human inventions including language.

2.0 Metaphor from the interactivist framework

In studying the processes of thinking, the concept of metaphor has been central (Lakoff and Johnson 1980, Lakoff 1987, Gentner and Markman 1997). Research on metaphor from a non-interactivist framework has been abundant (Black 1962, Lakoff & Johnson 1980, MacCormack 1985, Ortony 1979, Richards 1936). However, Indurkhya (1992, 1994, 1999) has written rather extensively on the subject from the perspective of interactionism.

The concept of interactivism (the terms interactionism and interactivism are understood here to be interchangeable) emphasises the emergence of representations internally in a system (such as the brain) as a consequence of the interaction between the system and its external environment. Hence, interactivism is a functional, non-encoding model of emergent representation (Bickhard, 1993). An important difference between this model and the encodingist ones is that representations in the agent are implicit. Implicit representations will allow the agent itself to detect errors in its system organization without requiring an external observer. An analogy with the computer will be that the system itself can detect errors in its programming and correct them instead of the external computer expert. This model of mental representation provides a particular view of metaphor. It should be understood as a 'specialized system activity', in the sense Bickhard (ibid.)

uses to describe various manifestations that are familiar to us like perception for example. I would like to extend this phrase to metaphor as well.

Bickhard (1998) has also proposed that representationality should not be looked at as monolithic but comprises, many levels. I would like to propose that as a specialized system activity, metaphor corresponds to three levels of representationality. The term 'role' is used to describe how the metaphor displays itself at each level of representation. Hence, there are three roles of metaphor that underlie human cognitive processes. It is proposed that these roles are: as a vehicle for categorization, for comparing in illuminating understanding; and for creating new knowledge.

2.1 First Role of Metaphor: categorisation as a specialized basic level metaphorical system activity

Categorisation sorts things. In the preface to his seminar work *Women, Fire and Dangerous Things. What Categories Reveal About The Mind*, Lakoff (1990: 5) said that "There is nothing more basic than categorization to our thought, perception, action and speech". We are doing an act of categorizing every time we identify a particular thing as some kind of thing. This is also probably how non-human creatures go about identifying objects in their environment too. Lakoff (ibid.: 6) also drew attention to the traditional conception of categorization which is termed 'classical' To be in a particular category, from the classical view, is to possess features that are necessary and sufficient for deciding what belongs in which category. To categorize things, a comparison of similarities based on the above conditions has to be made. However, Lakoff (ibid) thinks that the classical view of category is not enough to explain how we categorize. If we understand classical categories as just involving the comparison of common set of features than Gentner and Markman's (1997) proposal to reconcile similarity-based mapping with theory-based accounts is an acknowledgement of the inadequacy of the classical view of categorization in understanding the cognitive processing of the mind.

As mentioned earlier, this paper takes an interactivist view of metaphor as a special manifestation of system activity. The shortcoming of viewing metaphor from other points of view has been reviewed elsewhere (see Indurkhya 1997) so I shall not go into that again. Instead this paper proposes a way to construe various roles of metaphor as specialized activities of the system at different levels of representation. It is felt that a consequence of viewing metaphor this way is to consider the process of categorization as a metaphorical activity. How is this so?

Bickhard (1999) described his level three of representationality (interactive implicit definition and differentiation) as

> a kind of representationality that is implicit in system functioning system environmental interaction that has already occurred (p.6) some environments will yield the same such final state, while other environment will (or would) yield quite a different state. The final possible states of such a subsystem, then, serve as a differentiation of its class of environments (p 7) in level three we have implicit definitions of environmental categories (p.10)

At this level, what gets represented in the system as discussed by Bickhard is differentiation of the environments that are interacted with by the system. The outcome of such differentiations would be to group together environments that will yield the same final state after the interaction. In other words, environmental *categories* are differentiated by these final states. We can see that at this level of representationality that Bickhard discussed, the system activity of categorization is introduced. In interacting with our environments, our brain is already implicitly differentiating these environments and categorizing them according to similarity in outcomes expressed by the final states. Representational content with regard to categorizing is already implicit without us providing this content outside the system.

As far as system activity is concerned, I propose that categorization is a manifestation of stability. The interaction between a cognitive agent and a particular object (book) has produced stable representations of the book which are invariant under most circumstances. I would like to propose that this pattern of invariants with regard to neural architecture could also be viewed as constituting a memory trace, an engram. All continuous experiences of particular objects (Harnad 1982) will be reduced to a memory trace that embodies necessary and sufficient features to be known as category Many researchers have pointed out that a category is a type not a collection of instances because what constitutes a memory trace would be patterns of invariants arising out of all continuous experiences.

It is suggested that this pattern of invariance arising out of system activity that undergoes stabilization of features when a cognitive agent interacts with an object is metaphorical in nature. Usually, we would relate categorization to features of things instead of highlighting the different domains these things come from (we do not usually categorize chairs with desks, although we could). But features and domains are interconnected hence we could describe the metaphorical nature of categorization based on objects in different domains. It is only when objects which exist initially in different domains are found to show similar features that they would be put under the same category Thus, Gentner and Markman (1989, cited in Choe 2002) wrote that the concept of metaphor is the underlying, all embracing process that creates similarity when different domains are mapped onto each other. A penguin lives in a different

domain than a robin but using similarity of features we could consider whether they would fall under the same category Lakoff (1987) informed that Dyirbal, the Australian aboriginal language, categorizes women, fire and dangerous things of different domains under the same category called *balan*. Therefore, categorization is metaphorical in nature where features which are considered similar are grouped under the same category I think these examples show that describing categorization in terms of patterns of invariance would allow us to view categorization as metaphorical.

2.2 Second Role of Metaphor: understanding previously unexplained phenomena

How could we understand the second role of metaphor from the interactivist framework? Again I shall pitch this understanding to Bickhard's model of representationality I would like to discuss this with reference to Gentner and Markman's (1977 45) writing on structural alignment involving Kepler's analogical reasoning between motive power that moves the planet around the sun and light I suggest that this can be looked as a specialized system activity that allows learning to take place. This is level 8 in Bickhard's levels of representationality In this level, learning ". .changes the nature of optimal organization within that interactive system" (1998. 10). "It does involve prior knowledge, at least in a heuristic form – knowledge of sorts of problems associated with sorts of likely solutions" (2001 2). Bickhard characterizes learning as problem solving based on similarities between the new problems with new solutions to be found and old problems and old solution of what worked in the past. He emphasizes the *relationships of similarities* when comparing between new problems and solutions and their corresponding old problems and solutions (2001: 17). We do not have to go into detail to understand that heuristic problem solving in learning is also metaphorical. The key terms he uses i.e. relationships of similarities should remind us of metaphor. I would like to suggest, however, that the comparison to be made between 'old knowledge' and ' new knowledge' is not that of simple mapping of attributes that we looked at in categorization but that of causal relations between them. Similarity involving causal relations requires that the structures which made up the things compared be highlighted instead of object attributes. As I have said earlier, this is important for learning and shall now argue for this using Kepler's analogical example Gentner and Markman (1997 46) provided.

In trying to understand what motive power drives the planets to move on a fixed orbit round the sun, Kepler used the analogy between light and the motive power. Describing this analogy Gentner and Markman (1997 46) wrote:

> If light can travel undetectably on its way between the source and destination, yet illuminate its destination, then so too could the motive force be undetectable on its way from sun to planet, yet affect the planet's motion once it arrives at the planet. But Kepler was not content with a mere proof of possibility. He pushed the analogy further. He used it to state why the motive power diminishes with distance Just as the light from a lamp shines brighter on near objects than on further ones, so it is with the sun's motive power, and for the same reason: The motive power (like the light) is not lost as it disperses but is spread out over a greater area.

Kepler understood the old problem (illumination) and its solution (light, nearer brighter than farther) and applied this to new problem (movement of planet) and 'found' its new solution (motive power, nearer stronger than farther). Kepler was looking for a solution to a new problem he was facing. He was familiar with the light and its causal relations. These relationships between light and its illumination on objects were used by Kepler to provide causal relations between the sun and the revolving planets and 'explain' how the motive power is able to cause the planets to move and the differences in the planets' motion. Kepler wasn't comparing the similarities between the attributes of light and the planets to learn about the motive power but structural relations between the source (light) and the target (motive power) domains he was studying. It is when he was able to discover some kind of structural alignment between the source and target domains that the problem was solved and learning took place.

The consideration on similarity of structure between the source and target domains clearly differentiates this kind of metaphorical system activity from categorization which operates on similarity of attributes. From the interactivist framework, Gentner and Markman's (1997) structure alignment comparison is to be understood as an implicit system activity. Therefore both, mapping of attributes and structure alignment that they propose to account for cognitive processing are still private to the cognitive agent in nature. For real insights where scientific 'creation' (in the sense of Indurkhya's) can take place, structure relations comparison induced by reality outside the private individual is required making scientific 'creation' public in nature. This will then give rise to the social structure of science (see Hull 1997) that scientists observed.

This role of metaphor is felt to be a higher level stage. I would like to suggest that we go through the basic stage of categorization first before moving on to this higher level. As mentioned above, categorisation is involved in recognition, hence we must be able to recognize what we are dealing with before being able to notice or manipulate object properties related to causal

relations in the sense of structure mapping Gentner and Markman discussed with regard to Kepler's discovery.

2.3 Third Role of Metaphor: creating new phenomena

Indurkhya has written persuasively on the importance of similarity-creating metaphors (1998, 1999). In a nutshell, the role of metaphors is not just in " .pointing the existing similarities between. .objects or situation" (1998. 45) but " under certain conditions new perceptual and conceptual features can be created" (1998: 44) by metaphor.

Could I be so bold to state that similarity-creating metaphor that uses structure in the source domain to force a new way of looking at the target domain's structure (but still preserving its old structure as suggested by Indurkhya (1998) is a reality-induced phenomenon that implicit representational systems are not capable to process when shut off from reality. This statement seems contradictory since we know that the consciousness of reality-induced phenomena has to be stated by the individual, private cognitive agent who somehow then must have the internal capability to realize these structures in the first place. Otherwise, these structures cannot be stated. To overcome this paradox, I suggest that we look at implicit representational systems as only having the potential to be induced by the structure creating metaphors which reside in reality-hence in the public realm.

I argue that this public aspect of structure creating metaphor is an important trait that requires serious consideration. The history of science shows that public validation of scientific theories (by a community of scientist) has been instrumental in helping science progress in spite of the assertions of individual scientists.

Although knowing starts off as an individual experience, this experience does not guarantee scientific validity. Validation is to proceed by a community of experts. Therefore, having an individual experience of a phenomenon would just stay as internal knowledge regardless of its truth value as far as science is concerned. Einstein had an individual experience of Theory of Relativity but as long as it stayed as internal knowledge unvalidated by the community of experts, it would not have been science. Therefore, this individual experience would not be a guarantee that knowledge out of individual experience complies with what scientific facts are which are about reality that resides outside the individual mind. The structure of scientific knowledge lies external to the cognitive agent. Scientists have noted this. Campbell, for example, once wrote that the search for scientific validity lies in the social structure of science (1977: 13, cited in Hull 2001: 158) and that views proposed by scientists have to be tested and the tests be taken seriously (cited in Hull 2001: 165).

Maybe a reason why science requires validation external to the individual scientist is because it is impossible for an individual scientist to test all the proposals since scientific laws are spatiotemporally unrestricted. But I like to propose another reason why the social structure in science in the form external validation with respect to metaphor is necessary – that is the knowledge of the structure of our universe which science ultimately deals with can only come about from the interaction between our mind and reality. This has been stated before at least by Indurhkya (1998, 1999). Eventually, what science will have to uncover is the coherent structure of the whole universe. In other words, scientists will have to discover the complete constitution of the universe and how the elements that form this constitution are related causally outside the mind. The mind is a specialized system activity that evolved to seek this structure. The structure does not reside in the mind otherwise, learning would not take place whereas we know that learning takes places all the time. However as stated by Indurhkya (ibid), this structure can only be revealed from the interaction of the mind with reality Thus, the mind is an all-encompassing metaphorical mechanism that slowly reveals this structure.

Since the mind has to interact with reality for the structure of the universe to be apparent, therefore it must then contain part of the mechanism that allows the whole structure that science seeks. I suggest that this third role of metaphor rides piggy-back on the second role using the similarity of causal relations seeking system activity I would like to discuss further with some examples from Gentner and Markman (1997) in arguing for this conclusion.

In their paper titled *Structure Mapping in Analogy and Similarity*, Gentner and Markman considered that using just the similarity-based account of comparison relying on common features, one is not able to distinguish between bats and birds because they have similar perceptual and behavioural characteristics. Hence, in their words, " ..similarity's role in categorization has been challenged" (1997 54). I would like to argue that bats and birds can still be distinguished using similarity-based comparison of features. Someone who is familiar with both domains of birds and bats will be able to spot non-obvious differences, such as giving birth to live young and milk suckling. I consider these characteristics as features since they are patterns of invariance spelt out in the interactivist framework. Using bats and birds as an example to discredit similarity-based account does not quite work. A better example to argue against this account will be the ring species.

The ring species refer to populations of species that are found in a ring around the globe where interbreeding is possible if these populations are next to each other on this ring. However, one finds that at one point of this ring two species that happen to be next to each other do not interbreed hence would be considered as separate species. The gull species are such an example.

In Britain, they are known as herring gulls which are white. Going eastward from Britain, white-coloured gulls are also found in Siberia. They are able to interbreed with herring gulls of Britain. As we go further east, in America, the gulls have black specks on them but are still able to interbreed with their Siberian counterparts. Further eastward of America the gulls have become black and hence called black-backed. These gulls are not able to interbreed with the herring gulls of Britain.

The ring species should pose a more difficult problem for the similarity-based account to distinguish objects under separate categories based on features alone. This is because as gull species the birds would have a lot of features in common. The knowledge that we have of a particular species of gull based on features would not allow us to distinguish other species of gulls. Using structural relations of which the second role of metaphor is based also does not help since these structural relations are based on the existing gull species known in advanced much like having the knowledge of the existing structural relations of light to understand Kepler's planetary motion. We require something more independent of the existing knowledge of gull species other than stable features or structural relations. We need the knowledge that they are separate species due to the fact that these various species of gulls do not interbreed.

Indirectly, this is what Gentner and Markman (1997) proposed when they suggested a theory-based account of categorisation. This is because the theory used in biology to distinguish separate species would be the 'biological species concept' of non-interbreeding. Although this idea has been controversial, Mayr argued that this is still the most practical way to distinguish species (1988· 318 – 319). The theory based on the 'biological species concept' of non-interbreeding is used to distinguish the two gull species we referred to above putting them under separate categories.

For the idea of non-interbreeding to be a discriminating concept, scientists have to work with various species that exist and study the 'causal relations' among them. Mayr (1998: 140), in differentiating between the species taxon and higher taxa wrote "an essentialist (typological) definition is satisfactory and sufficient at the level of the higher taxa. It is, however, irrelevant and misleading to define species in an essentialistic way because the species is not defined by intrinsic, but *relational* properties". [Original emphasis] Explaining what he means by the terms relational properties, Mayr (ibid). went on to say that "The word 'species' likewise designates such a relational property. A population is a species with respect to all other populations with which it exhibits the relationship of reproductive isolation – non-interbreeding".

I have said earlier that the third role of metaphor is parasitic on metaphor's second role. It uses the heuristic of structural relations to create a point of contact with the structural relations as proposed by Mayr (1997) among

phenomena (such as biological species) implicit in physical reality How it exactly does this is not too clear.

Embarking on the discovery the non-interbreeding definition of the species concept is a structural quest in the physical world. Scientists need to have some idea how various populations of species are causally related to each other. This could not happen if scientists approached the subject according to the second role of metaphor. Being able to 'know' that what distinguishes species is non-interbreeding requires the scientist to find the structure in the physical environment. Nothing in the mind of the scientist based on previous knowledge such as comparison of stable features will allow this insight to take place. The structural relations Mayr (1998) referred to exist outside the mind - in physical reality This is why this way of thinking differs from the structural comparison characteristic of metaphor's second role. The second role is mainly involved in understanding of observed phenomena, whereas the third role creates new phenomena.

The brain recognises, understands, and creates phenomena. These processes of recognising, understanding, and creating, it is argued in the paper, are metaphoric in nature. These processes could be described by the three different roles that characterise metaphor in the form of its activities in the brain. Although there are three roles, they are different facets of metaphor much like our ability to be different personalities at different occasions. Describing metaphor from the interactivist framework means that it relates to how representations in the brain are organised. This organisation is dynamic allowing Piaget's ideas of assimilation, accommodation, and equilibrium to take place. The writer would also like to suggest that humans in living their lives would be using any combination of these modes of thinking – whether to recognise, understand, and/or create. Underpinning these modes will be these roles of metaphor.

3.0 Implication for the understanding of language

The common understanding of metaphor among linguists is that it is beautiful language. From the perspective of interactivism which this paper is proposing, metaphor is specialised brain activities. It has at least three roles. Each role is characterised differently. If we assumed that metaphor is related to the production of language, this production should also be tied up to these characteristics which the paper proposes.

Take the first role of metaphor which is involved in categorisation. If an activity of the brain is 'tuned' to this role, the production of language will be tied up to the process of categorisation. From the writer's experience of working with students of architecture, the language produced by them when

discussing their design projects is mainly categorical in nature. This is especially so when discussing terminologies and arguing out their case for a particular approach in design. In fact, studies have been done using the concept of categorisation in analysing talk (see Sacks, 1984, Lepper, 2000).

Obviously, the effects of the other two roles of metaphor could also be seen in language production if these roles describe correctly the activity of the brain. With regard to language learning, Danesi (2000) has proposed a framework based on metaphor for a more enlightened understanding of language. However, as long as the view of metaphor is not understood as a system activity of the brain based on interactivism, we would not have a correct functioning of it as a naturally occurring phenomenon. Thus, this view connects language back to biology, specifically neurobiology, where language naturally belongs.

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