

On the Study of Synesthesia and Synesthetic Metaphor*

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Abstract—This paper aims to introduce a brief review on the study of synesthesia from two different perspectives. By presenting these different findings from various approaches, more information about the nature of synesthesia can be learnt.

Index Terms—synesthesia, synesthetic metaphor, conventional metaphor theory, conceptual metaphor theory

I. INTRODUCTION

Etymologically speaking, the word “synesthesia” or “synaesthesia” comes directly from the Greek words “syn”, which means “together”, and “aesthesia”, which means “perception” or “sensation”.

Synesthesia has a long research history. In the late nineteenth and early twentieth centuries, synesthesia enjoyed a flurry of scientific study, mostly descriptive. By the mid-twentieth century, however, synesthesia had fallen off scientists’ radar, a casualty of the behaviorism movement (Carpenter, 2001). In the 1990s, and especially since the turn of the century, there has been a renaissance of research on synesthesia, with many outstanding researchers publishing their data in books and journals (e.g., Baron-Cohen, 1996; Baron-Cohen and Harrison, 1997; Cytowic, 1997; Harrison, 2001; Shen, 1997; Yu, 2003).

Generally speaking, there are two paths to the study pertaining to synesthesia (Day, 1996). The first, which makes use of scientific approaches, mainly investigates the phenomenon of real co-sensation. For example, one may experience that high vowel sounds can cause the sensation of bright colors, e.g., the higher the pitch of the music he/she hears, the brighter the visual image he/she feels. The second, which follows from theories of metaphor, chiefly describes the milder forms of intersensory associations and connections revealed through language (i.e. synesthetic metaphor).

Though there exists difference between the two paths, they are by no means irrelevant. On the contrary, they are closely related. In particular, the first approach can provide scientific bases for the relevant linguistic research.

II. AN ANALYSIS OF SYNESTHESIA FROM A SCIENTIFIC PERSPECTIVE

A. The Existence of Synesthesia

Scientists have been convinced of the existence of synesthesia and cite evidence in support (Baron-Cohen, 1996):

- a. The impressive test-retest reliability in the consistency of colours triggered by different words (in the case of “coloured hearing”).
- b. The similarity of reports from different cultures and different times across the century.
- c. The consistency of sex ratio (it is overwhelmingly a female condition).
- d. The familial pattern to the condition.
- e. The neuroimaging data showing different cortical blood flow patterns in women with synesthesia in comparison to women without the condition.

B. Phenomenology of Synesthesia

Cytowic (1997), a major researcher on synesthesia, finds that synesthesia is the involuntary physical experience of a cross-modal association, because the stimulation of one sensory modality causes a perception in one or more different senses. Based on various case studies, Cytowic (1997) puts forward five diagnostic features of synesthesia.

- a. Synesthesia is involuntary and unsuppressable but elicited by a stimulus that is usually identified without difficulty.
- b. Synesthesia is projected. It is perceived externally in peri-personal space, the limb-axis space immediately surrounding the body.
- c. Synesthetic perceptions are stable and durable. For example, if someone experiences the color red when viewing the digit “3”, he/she always experiences exactly that color. Experiments to test the consistency of synesthetic experience found that after a period of one year, 92.3% of reported synesthetic responses were identical with those given a year earlier. Furthermore, synesthetic experiences are genetic and unelaborated. Synesthetes (i.e. individuals who experience real co-sensation) may experience colors, simple shapes, or feel rough or smooth textures, and while these may be

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highly specific, they do not go beyond base perceptions.

d. Synesthesia is memorable. Memories of synesthetes are often excellent.

e. Synesthesia is emotional. The experience is usually accompanied by a sense of certitude (the “this is it” feeling) and a conviction that what synesthetes perceive is real and valid.

C. *Neurological Research on Synesthesia*

Over the past 200 years a number of hypotheses have been put forward to explain the cause of synesthesia. Current theories, however, in some way recognise the findings of recent neurological studies that suggest the possibility that the executive areas of the human brain, primarily in the frontal lobes, manifest a high degree of sensory integration. Among these current theories, the Cross-Modal Transfer hypothesis and the Neonatal Synaesthesia hypothesis are most influential.

The Cross-Modal Transfer hypothesis (Lyons, 2001) is now a widely accepted explanation for the occurrence of synesthesia although it was radical when it was first proposed. It supports the view that detection of intersensory equivalence is present from birth, and that perceptual development is characterized by gradual differentiation.

The Neonatal Synaesthesia hypothesis builds on the Cross-Modal Transfer evidence, but suggests that early in infancy, probably up to about 4 months of age, all human babies experience sensory input in an undifferentiated way. Sounds trigger auditory, visual as well as tactile experiences all at once. Following this early initial phase of normal synesthesia, the different sensory modalities become increasingly modular. Adult synesthesia, has been suggested to be as a result of a breakdown in the process of modularization, such that during infancy the modularization process was not completed (Lyons, 2001). This view implies that if not now, then at some time in the past, people have all experienced synesthetic perception.

D. *Psychological Research on Synesthesia*

During the past decades, psychologists have conducted fruitful research on synesthesia (e.g., Baron-Cohen and Harrison 1997; Cytowic 1989; Harrison 2001; Marks 1978). Psychologists believe synesthesia is a normal cognitive functioning and regard it as the product of a mental association of sense-data. According to the psychological experiments, the correspondences of sense-data are consistent. Furthermore, the results of normal subjects resemble those of synesthetes, which can suggest that the phenomenon of real co-sensation and synesthetic metaphor are only gradually different.

E. *The Importance of Scientific Research on Synesthesia*

The findings from various scientific domains on synesthesia play an important role for people to study the major concern of the dissertation (i.e. synesthetic metaphor). The reasons are as follows:

Firstly, the scientific evidence which proves the existence of synesthesia and the five diagnostic features of synesthesia proposed by Cytowic (1997) suggest that synesthesia is both physiologically and psychologically real, which is the prerequisite for the study of synesthetic metaphor.

Secondly, neurological studies bring out the possibility of sensory integration in the front lobes of the brain, which may provide neurological basis for synesthetic metaphor.

Finally, research from psychology brings forward an important finding that the phenomenon of real co-sensation and synesthetic metaphor are only gradually different. Therefore, a psychological analysis of synesthesia will be helpful for people to appreciate the depth and extent of human metaphorical capacity.

To sum up, the research of synesthesia in science can shed important light on the study of synesthetic metaphor in linguistics. In the first place, it proves that synesthesia is physiologically and psychologically real, that is, synesthesia does exist. In the next place, it provides us with an important fact that synesthetic metaphors, though linguistically shaped, may have some neurological and psychological underpinnings, which will facilitate the readings of synesthetic metaphor.

III. AN ANALYSIS OF SYNESTHESIA FROM A LINGUISTIC PERSPECTIVE

Different from the phenomenon of real co-sensation, synesthetic metaphor involves the transfer of attributes of one sensory domain to another sensory domain. For example, in the phrase “a cold light”, people talk about a visual concept (light) in terms of the word (cold) that belongs to the touch domain.

Everyday language is rife with synesthetic metaphors. In English, people have expressions like “noisy colour”, “cold words”, “sweet face”, “soft green”.

Synesthetic metaphors are ubiquitous in literary works as well:

And like music on the waters

Is thy *sweet voice* to me.

(George Gordon Byron *There Be None of Beauty's Daughters*)

In the above example, the phrase “sweet voice” makes the whole sentence vivid and creative. What is special about it is that words for taste (sweet) is used to describe hearing (voice). In other words, it is the usage of synesthetic metaphor that gives the sentences a sense of originality.

Due to the novelty and creativity of synesthetic metaphor, many researchers tend to analyze the phenomenon. As a type of metaphor, synesthetic metaphor can be approached from the perspective of conventional metaphor theory or conceptual metaphor theory.

A. Perspective of Conventional Metaphor Theory

Conventional metaphor theory regards metaphors as “figures of speech, i.e. as more or less ornamental devices used in rhetorical style” (Ungerer and Schmid, 1996, p.114). Metaphorical language, according to its claim, is a matter of deviation from the norm instead of a part of ordinary conventional language.

Influenced by the theory, some Chinese scholars such as Yan W. & Zhihong Z. (1998) and Hongying D (2000) are devoted to the discussion of synesthetic metaphor from the rhetoric point of view. They believe that synesthetic metaphor has an important ornamental function in literary works. What's more, synesthetic metaphor can also be combined with other figures of speech such as simile, oxymoron, transferred epithet to evoke multiple experiences.

The traditional metaphor theory puts its emphasis on the ornamental function of synesthetic transfer. However, when it is applied to account for the structure of synesthetic metaphor, it doesn't work.

In his *Synaesthesia and Synaesthetic Metaphors*, Day (1996) states that synesthetic metaphor can not be accounted by traditional semantic metaphor theories due to its novelty of cross-modal associations. To clarify his viewpoint, he takes the comparison theory for example.

The comparison theory tends to regard metaphor as a form of elliptical simile (Goatly, 1997). In other words, metaphor interpretation is usually accomplished by turning each expression into a complex simile-like form. For instance, to say “King Richard was a lion” is really to say “King Richard was like a lion”.

The comparison theory works quite well with current syntactic theories (Day, 1996). However, when it is applied to explain synesthetic metaphor, it does not hold water. The problem of the comparison model is its claim that the underlying simile form with the “like” is always retrievable and that it always has the same semantic or pragmatic meaning as the form with the suppression or deletion. The claim, in fact, is workable in interpreting sentence such as “King Richard was (like or similar to) a lion”. Nevertheless, when the model is used to account for a sentence containing synesthetic metaphor, it poses too much of a problem. For example, if the sentence “The violin gave a sour sound” (“sour sound” is a synesthetic metaphor) is expanded, it will change into “The violin gave a sound like or similar to the sourness of ‘something’”. Relevant to “a sour sound”, though Webster gives some definition to be interpreted as metaphorical such as “hostile”, “unpleasant”, “sullen”, readers are at a loss as to retrieving the underlying form, and thus, the metaphor is still unresolved.

B. Perspective of Conceptual Metaphor Theory

Since traditional semantic metaphor theory is inefficient in interpreting synesthetic metaphor owing to its own limitation, the study of synesthetic metaphor should be carried out in a broader background.

With the rising of the second trend of the cognitive science in the early 1970s, the study of metaphor has extended its scope to cognitive linguistics. Along this movement, a new paradigm in metaphor research was introduced by Lakoff and Johnson in their epoch-making book *Metaphors We Live By* (Lakoff and Johnson, 1980). Their main viewpoint, which is later known as “conceptual metaphor theory”, holds that metaphor is ubiquitous in everyday language and thought. Rather than mere poetic or rhetorical embellishment, metaphor is a major and fundamental part of people's ordinary way of conceptualizing the world.

Compared with the traditional perspective, the conceptual metaphor theory is revolutionary. In fact, the conceptual metaphor theory is a very good candidate to fully interpret the synesthetic metaphor because it can provide wider context than other metaphor theories as described in the following table (Table 2.1) proposed by Leezenberg (2001).

TABLE 2.1:
A CLASSIFICATION SCHEME OF METAPHOR THEORIES (LEEZENBERG 2001: 11)

Basis of interpretation	Referentialist (‘comparison’)	Descriptivist (‘interaction’)	Conceptualist
Level			
(Syntax)	Chomsky	Bickerton	Reinhartse
Semantics	Mooij; Henle	Black I; Beardsley; Stern; Goodman	Lakoff & Johnson
Pragmatics	Grice	Black II; Searle; Martinich	Levinson; Sperber & Wilson
Outside linguistics proper	Davidson		Lakoff & Johnson

This table, in fact, is a classification of metaphor theories made by Leezenberg (2001). Compared with previous classifications (e.g., Black, 1962; Mooij, 1976), Leezenberg puts metaphor theories in a relatively wider context. Hence, it can give people a clearer picture to see metaphor theories. More importantly, this classification scheme includes most (if not all) of the major metaphor theories. Leezenberg classifies metaphor theories from two perspectives: (1) at what level is a metaphor accounted for? Is the metaphorical interpretation within linguistics or just outside linguistic theory? If a metaphor is accounted for within linguistic theory, then the levels are syntax, semantics, and pragmatics. If not, it is then outside linguistic proper; (2) through what means does a hearer determine the metaphorical interpretation, for

instance, in virtue of the descriptive information associated with the expressions used, or in virtue of the concepts or mental representation that are expressed by the words. Thus, a hearer can understand a metaphor in virtue of the properties that the referents of the metaphor have in common; this is called “comparison view”. Leezenberg believes that such views are generally “referentialist”, because they crucially involve the referents of the expressions used. From another perspective, the hearer can understand metaphor via the meaning of linguistic expressions, that is, the descriptive information. This comes to “interaction views”, which Leezenberg classifies as “descriptivist” since these approaches take metaphorical interpretation to be guided by the descriptive information. And finally, quite different from the above two perspectives, one may hold that metaphorical meaning arises neither from resemblances between objects nor from descriptive information, but rather from cognitive mechanism such as the ability to see one thing as another, or as reasoning in analogies. Such approaches Leezenberg refers to as “conceptualist views” because they assign an important role to the interpreter’s mental or conceptual capacities.

The philosophical basis of conceptual metaphor theory is described as “embodied realism” in *Philosophy in the Flesh* (Lakoff and Johnson, 1999). According to Lakoff (1993), embodied realism arises from the most fundamental empirical results, which provide several types of empirical evidence for the embodied meaning. This extensive evidence for the experientialist view suggests that “experience is the result of embodied sensorimotor and cognitive structures that generate meaning in and through our ongoing interactions with our changing environments. Experience is always an *interactive* process, involving neural and physiological constraints from the organism as well as characteristic affordances from the environment and other people for creatures with our types of bodies and brains” (Johnson and Lakoff, 2002, p. 248). Therefore, meaning arises, not just from the internal structures of the organism, nor only from the outside world, but rather from an interaction between the organism and environment.

In *Metaphors We Live By*, Lakoff and Johnson (1980) state that human conceptual system is metaphorically structured and defined. According to them, conceptual metaphor is a system of metaphor that lies behind much of everyday language and forms everyday conceptual system, including most abstract concepts. Metaphor, in essence, is “understanding and experiencing one kind of thing in terms of another” (Lakoff and Johnson, 1980, p.5).

According to Lakoff and Johnson (1980), the working mechanism of conceptual metaphors lies in the fact that conceptual metaphors are mappings across different conceptual domains, involving projections from a source domain to a target domain. They claim that:

- a. Metaphorical mapping is uni-directional and asymmetric, that is, from the more concrete to the more abstract.
- b. Metaphorical mapping is partial, not total, namely, the structure of the source domain is only partly projected to the structure of the target domain.
- c. Metaphorical mapping is not random and arbitrary, but grounded in the body and everyday experience in the physical and cultural world.
- d. Metaphorical mapping is systematic across different conceptual domains.

Being influenced by the conceptual metaphor theory, some researchers tend to study synesthetic metaphor from a different point.

1. Day’s study on English literature

A comprehensive study was conducted by Day (1996) on the use of synesthetic metaphors in English literature. Day’s data was collected from both printed texts and electronic texts, the latter of which came from sources that include the World Library’s *Greatest Books Collection* (1991) CD-ROM (Dos format), the Oxford Text Archive, and Project Gutenberg. The time-range covers books from Chaucer’s *Canterbury Tales* written in 1387; Shakespeare; 19th century novelists such as Melville; and currently popular novels such as those by Michael Crichton.

By analyzing the percentages of concurrency of each synesthetic metaphor in English, Day (1996) concluded that synesthetic metaphors are both to some extent neurological and to some extent the logical default conclusions of the physical world around us and the logical imperatives of human biology as a whole.

2. Shen’s interpretation of cognitive constraints on synesthetic metaphors

Shen (1997) elaborates cognitive constraints on different poetic figures, including synesthetic metaphor. He claims that cognitive constraints provide an explanatory mechanism that accounts for regularities characterizing poetic language over and above context (e.g., a specific text, poet, school, or period). Those regularities found in poetic language, according to him, “conform to *cognitive* rather than linguistic or contextual constraints, i.e., constraints which are derived from our cognitive system and its organizing principles” (Shen, 1997, p.35). In particular, he explains the issue of the direction of synesthetic mapping. He notices that synesthetic poetic metaphors seem to be highly selective with respect to their directionality of mapping.

Shen (1997) analyzes synesthetic metaphors drawn from modern Hebrew poetry which introduces a set of poets that belong to a totally different cultural environment and to a different period (the twentieth rather than the nineteenth century). The corpus analyzed consists of 130 instances of poetic synesthesia, taken from the writing of 20 modern Hebrew poets who were active during the first eighty years of the last century. The poets selected represent four distinct historical periods in the evolution of Hebrew poetry.

After the analysis, Shen finds that the routes of synesthetic transfers in Hebrew corpus tend to map hierarchically from lower senses to higher senses. He proposes that the above tendency of synesthetic transfer follows from the general cognitive constraint which suggests that “a mapping from more ‘accessible’ or ‘basic’ concepts onto a ‘less

accessible' or 'less basic' ones seems more natural, and is preferred over the opposite mapping" (Shen, 1997, p.51).

3. Yu's study on Chinese novels and short stories

Yu (2003) analyzes examples of synesthetic metaphors extracted from the Chinese novels and stories written by Mo Yan, a preeminent contemporary Chinese novelist famous for his innovation with language. The images Mo Yan has shaped with words are graphic and constitute the "literariness" by which his works are distinguished. Yu divides the sense of sight into two subcategories: color and dimension. By analyzing his data, Yu (2003) finds eleven kinds of cross-modal mapping in all. Among them, eight kinds of mapping are upward transfers as listed below (the formula of "A→B" reads words of "A" domain transfer to "B" domain):

- a. TOUCH→SMELL
- b. TOUCH→SOUND
- c. TOUCH→COLOR
- d. TASTE→SOUND
- e. DIMENSION→SOUND
- f. DIMENSION→COLOR
- g. COLOR→SOUND
- h. SOUND→COLOR

Yu (2003) concludes the use of Mo Yan's synesthetic metaphors, although very novel and unusual, largely conforms to some general tendencies found in both ordinary and poetic language by previous empirical studies (Ullmann 1964, Williams 1976). The finding supports the claim that human meaning and understanding are embodied, constrained by the kind of body we have and how it functions.

IV. SUMMARY

There are mainly two approaches to the research concerning synesthesia. The first one concentrates on the study of synesthesia from a scientific perspective, which offers neurological and psychological bases for people to explore synesthetic metaphor. The second approach focuses on the study of synesthesia from a linguistic perspective, especially, from metaphor theories. Though apparently different, the first approach can contribute to the study of synesthetic metaphor in linguistics.

Though known for its originality, synesthetic metaphor, traditionally, is regarded as an ornamental device used in rhetorical style. However, due to its novelty of cross-modal associations, synesthetic metaphor can not be explained by traditional metaphor theories.

Different from the traditional ones, the conceptual metaphor theory proposed by Lakoff and Johnson (1980) provides more links and wider linguistic context for interpreting metaphors. In light of the theory, some researchers' study (Yu 2003, Day 1996 and Shen 1997) suggest that synesthetic metaphor are embodied. The directionality of mapping in synesthetic metaphor is not random, but rather follows a general pattern, that is, from the more concrete to the more abstract. This tendency indicates that synesthetic metaphor, similar to other metaphors, also embodies metaphorically cognitive and thinking process. At the same time, the fact that synesthetic transfers in both poetic and everyday language share the same directionality of mapping shows that synesthetic metaphors, either conventional or novel, are all grounded in our bodily and cultural experiences in the world.

REFERENCES

- [1] Baron-Cohen, S. (1996). Is there a normal phase of synaesthesia in development? *Psyche*, 2, 27-29.
- [2] Baron-Cohen, S. and Harrison, J. E. (eds.) (1997). *Synaesthesia: Classic and Contemporary Readings*. Oxford: Blackwell.
- [3] Black, M. (1962). *Models and Metaphors*, Ithaca, NY: Cornell University Press.
- [4] Carpenter, S. (2001). *Everyday Fantasia: The World of Synesthesia*. Web Transcription Tool. <http://www.apa.org/monitor/mar01/synesthesia.html> (accessed 24/6/2006)
- [5] Cytowic, R. E. (1989). *Synesthesia: A Union of the Senses*. New York: Springer-Verlag.
- [6] Cytowic, R. E. (1997). Synaesthesia: Phenomenology and neuropsychology-a review of current knowledge. In Baron-Cohen, S. and Harrison, J. E. (eds.) (1997), *Synaesthesia: Classic and Contemporary Readings*, Oxford: Blackwell, 17-39.
- [7] Day, S. (1996). *Synaesthesia and Synaesthetic Metaphors*. Web Transcription Tool. <http://psyche.cs.monash.edu.au/v2/psyche-2-32-day.html> (accessed 24/6/2006)
- [8] Goatly, A. (1997). *The Language of Metaphors*, London: Routledge.
- [9] Harrison, J. E. (2001). *Synaesthesia: The Strangest Thing*. Oxford: Oxford University Press.
- [10] Hongying, D. (2000). On Synaesthesia. *Journal of Sichuan Three-Gorges University*, 2, 59-62.
- [11] Johnson, M. and Lakoff, G. (2002). Why cognitive linguistics requires embodied realism. *Cognitive Linguistics*, 13 (3): 245-263.
- [12] Lakoff, G. (1993). The contemporary theory of metaphor. In Ortony, A. (2nd ed.) (1993), *Metaphor and Thought*, Cambridge: Cambridge University Press, 202-251.
- [13] Lakoff, G. and Johnson, M. (1980). *Metaphors We Live By*. Chicago and London: University of Chicago Press.
- [14] Lakoff, G. and Johnson, M. (1999). *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York: Basic Books.
- [15] Leezenberg, M. (2001). *Contexts of Metaphor*, Amsterdam/NY: Elsevier.

- [16] Lyons, A. D. (2001). Synaesthesia-A Cognitive Model of Cross Modal Association. Web Transcription Tool. <http://www.vislab.usyd.edu.au/user/alyons> (accessed 24/6/2006)
- [17] Marks, L. E. (1978). The Unity of the Senses: Interrelations among the Modalities. New York: Academic Press.
- [18] Mooij, J. J. A. (1976). A Study of Metaphor, Amsterdam: North Holland.
- [19] Shen, Y. (1997). Cognitive constraints on poetic figures. *Cognitive Linguistics*, 8 (1): 33-71.
- [20] Ullmann, S. (1964). Language and style. Oxford: Basil Blackwell.
- [21] Ungerer, F. and Schmid, H. J. (1996). An Introduction to Cognitive Linguistics. London and New York: Addison Wesley Longman Limited.
- [22] Williams, J. M. (1976). Synaesthetic adjectives: A possible law of semantic change. *Language*, 52 (2): 461-478.
- [23] Dejie, J. and Hongshan, Y. (2007). Study on Language Transfer. *Journal of Qingdao University of Science & Technology*, 23(4): 116-120.
- [24] Yang, W. and Hongzhi, Z. (1998). On the Linguistic Function of Synaesthesia in Poems. *Foreign Language Research*, 3, 64-66.
- [25] Yu, N. (2003). Synesthetic metaphor: A cognitive perspective. *Journal of Literary Semantics*, 32 (1): 19-34.

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