On the Directional Tendency of Synaesthetic Expressions : Between the Sense of Smell and Sight*

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1. Introduction

This paper deals with a figurative expression called *synaesthesia* and presents an alternative model for a semantic phenomenon.[1] Synaesthetic expressions are generally defined as "the perception, or description of the perception, of one sense modality in terms of another "(Preminger 1974 : 839). For instance, in *warm colors*, a tactile impression (i.e. *warm* here) is utilized to describe the visual experience of color. The problem is, however, that such a semantic transfer is not unrestricted among the five basic human senses of touch, taste, scent, sound, and sight. The gustatory sense, for example, can hardly be modified by an acoustic impression, as exemplified in **a noisy sweetness*. The study of this phenomenon has attempted to capture what semantic conditions motivate the acceptability of synaesthetic expressions. More precisely, it is by ordering the human sense modalities as a hierarchical schema that previous researches have attempted to solve the problem (Ullmann 1951, Willams 1976,

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[1] In this article, "synaesthesia" solely refers to a linguistic phenomenon as a branch of figurative expressions although it means such neuropsychological experiences as colored hearing and colored vowels (see Harrison and Baron-Cohen (1997) and Marks and Bornstein (1987), inter alia).

Yamanashi 1988, Shen 1997, inter alia).

Our specific concern in this article is to re-consider the traditional semantic hierarchies of synaesthetic expressions from a cognitive linguistics perspective (Lakoff and Johnson 1980, Langacker 1987, Lakoff 1990, and Shen 1997), and to overcome the problems that they exhibit. As will be outlined in section 2, previous studies regard the three senses of touch, taste, and scent as relatively "lower" senses, and the other senses of sound and sight as "higher" in the differentiated hierarchy, and they suppose that the former senses tend to serve as "favorable" sources for describing the latter impressions, not vice versa (Ullmann 1951, Willams 1976, inter alia). This might explain well why *warm colors* is acceptable while **a noisy sweetness* does not sound acceptable.

The traditional hierarchical approaches outlined above, however, commonly face the problem that they cannot provide any legitimate explanation for certain synaesthetic transfers. For instance, consider examples (1) below.

(1) a. akarui kaori
'bright fragrance'
b. hakkirishita kaori
'clear fragrance'

(Seto 2003 : 72)

In (1), a visual impression (i.e. bright), which was supposed to be higher than the olfactory sense, is utilized to modify the lower concept (i.e. fragrance). Examples (1) are cited from Seto (2003). It is one of the outstanding works in recent synaesthesia studies in that it shows many counterexamples to the directional hypothesis of synaesthetic transfers.[2] However, to our regret, Seto provides no alternative linguistic explanations with regard to synaesthetic transfers. As a result, he seems to deny even that synaesthetic transfers have a general tendency, or directionality.

This article presents an alternative hierarchical model motivating the tendencies of synaesthetic transfers. Our point of view is that the previous hierarchical models have inadequately analyzed characteristics of scent modality, as a result of which it is put in the wrong place of the hierarchy. We will argue that with the introduction of a cognitive factor called the "identifiablity of a stimulus source" into the hierarchical ordering of the five senses, we will show that the sense of smell, which has been considered as a lower sense in the literature, in fact, should be treated as a higher modality than those of touch, taste, and even sight.

We will review previous analyses arguing for the directionality of synaesthetic transfers section 2. In section 3 we will present an alternative hierarchy for synaesthesia with a certain discussion about the notion of identifiability of the stimulus source. Section 4 shows that our hierarchy for the figurative expressions provides a solution for problematic cases observed in previous studies. In addition, the matters implied by our proposal will be discussed. Section

[2] We must admit that there are some inadequacies in the processing the linguistic data in that Seto (2003) treats such expressions as *shapuna* 'sharp,' *okii* 'big' and *hukai* 'deep' as visual concepts.

5 is allocated for concluding remarks.

2. Problems with Previous Studies

The previous works can be grouped into three, depending on the hierarchical schemas that they present and the conditions that motivate the schemas : (i) Sense Modality Hierarchy Hypothesis, (ii) Development/Evolution Process Hypothesis, and (iii) Accessibility Hypothesis. We will review them in turn, and point out that any of these theories cannot sufficiently provide an account of the reason why scent related concepts are hardly transferred onto either sense modality of sight or sound.

2.1. Sense Modality Hierarchy Hypothesis

Through observing numerous synaesthetic metaphors from poetical works in English, French, and Hungarian in 19th century, Ullmann (1951) sets forth the hierarchical schema of (2).[3]

(2) Ullmann's (1951) Differentiatedness Hierarchy :[4]
Touch < Heat < Taste < Scent < Sound < Sight

According to Ullmann, hierarchy (2) will predict the transfer tendencies that the senses on the left side are likely to serve as a source domain for a synaesthetic transfer to those on the right sides. Thus, for instance, the sense of touch is readily able to serve as a transfer source for all the other senses, since it is the lowest modality in the hierarchy. This characteristic is shown in examples (3) below.

(3) a. a soft warm
b. a soft sweet
c. a soft fragrance
d. a soft voice
e. a soft light

On the other hand, the right most sense of sight is supposed not always to be allowed to describe other impressions as shown below.

(4) a. *a red touch
b. *a red warm
c. *a red sweet
d. *a red fragrance
e. *a red voice

Ullman suggests that this schema with the directionality of transferring is endorsed by a

[3] The data is from the following eleven poets : Byron, Keats, William Morris, Wilde, Dowson, Phillips, Lord Alfred Douglas, Arthur Symons, Longfellow, Leconte de Lisle, and Theophile Gautier. And he shows that according to this hierarchy, 1665 examples are upward transfers and 344 downward out of his 2009 samples.

[4] In this hierarchy "A<B" means that "A is less differentiated than B."

condition called *differentiatedness*: "transfers tend to mount from the lower to the higher reaches of the sensorium, from the less differentiated sensations to the more differentiated ones, and not vice versa" (Ullmann 1951: 280). Note in passing that we will provide a certain discussion on the acceptability of (4d) later in 2.2 and 4.1.[5]

One major problem with this model is that the scent sense is regarded as a favorable source for higher modalities, i.e. sound and sight. In fact, it is hardly possible to employ the terms of scent to describe the impressions either of sight or of sound. The examples are abound:

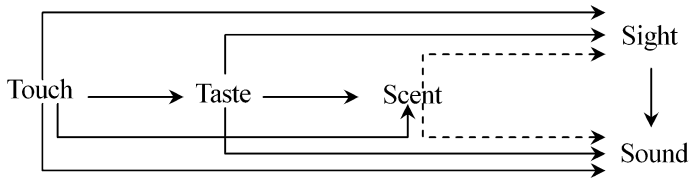
(5) a. *an aromatic color
    b. *an aromatic light
    c. *an aromatic sight

(6) a. ?an aromatic sound
    b. ?an aromatic voice
    c. *an aromatic noise

These examples shows that Ullmann's theory cannot always predict the transferring tendency correctly. In other words, although it may be true that the presented hierarchy of "Touch < Heat < Taste < Scent < Sound < Sight" properly reflects the differences of degree in differenciatedness among the human senses themselves, it is shown that their sensory differences are not straightforwardly reflected onto the acceptability of synaesthetic expressions. Let us move on to another model for synaesthetic expressions labeled as Development/Evolution Process Hypothesis.

2.2. Development/Evolution Process Hypothesis

Examining synaesthetic metaphors in Japanese prose (present-day novels and newspapers, and so on), Yamanashi (1988) presents a schema for synaesthetic transfers as follows.[6]



(Yamanashi 1988: 60)

<Figure 1>

[5] We should also note that Ullmann considers his hierarchy as the tendency but the strict rule. We could find such synaesthetic expressions that involves a downward transfer, but they alone will not mean at once that there are no transfer tendencies among the five modalities.

[6] The broken lines in the figure mean that the tendency of the transfer is relatively weaker than other transfers.

He notes that this schema also holds true in English synaesthetic transfers. One outstanding point of Yamanashi (1988) is that it has explicitly elucidated that the directional tendency of synaesthetic transfers is observed not only in literary works but also in ordinary languages.[7]

While the substantially same hierarchy is postulated as that of Ullmann's, Yamanashi's theory has two points departing from Ullmann's. First, theoretically, this hierarchy, or the directionality of synaesthetic transfers, is claimed to be motivated by the developmental/evolutionary order of the human senses. This idea is originated from Williams (1976).[8] Williams assumes that "the physical evolution of the sensory modalities appears to follow the order of transfers : tactile, gustatory, olfactory, acoustic/visual or visual/acoustic" (Williams 1976 : 472), and he further suggests that "paralleling this phylogenetic sequence is the ontogenetic history of the human neonate's sensory maturation." (Williams 1976 : 473)[9]

Second, as shown in <Figure 1>, Yamanashi assumes two types of synaesthetic transfers : a strong and a weak one. The latter is depicted in the broken lines in the figure, the transfers of which are supposed to be less familiar than those indicated by the solid arrows. As an instance that shows a transfer from scent to sight, Yamanashi provides example (7) below. Note that symbol % indicates that there was a response variance among the informants that he asked for the acceptability.

(7) % kaguwshii shikicho
'fragrant hue'
% kaguwshii shikisai
'fragrant colors' (Yamanashi 1988 : 60)

We, however, find two problems in the schema of <Figure 1>. First, with regard to the transfer from scent to sight, Yamanashi provides only two examples, which is (7). If the transfer is considered as one of natural synaesthetic transfers even if it is weaker, why can we not obtain a fully acceptable example, or more examples, in this transfer ? Second, Yamanashi (1988 : 59) provides the following example to argue that the transfer from sight to scent is unacceptable.

(8) *akai/?kurai nioi
'red/dark smell'

However, the following examples explicitly show the fact that the sight concepts can be

[7] Recent studies have pointed out that figurative languages are frequently found in everyday speech and that many are barely noticed (Lakoff and Johnson (1980), Lakoff (1990), Gibbs (1994), among others). And Langacker (1987 : 1) clearly says that "We … need a way of conceiving and describing grammatical structure that accommodates figurative language as a natural, expected phenomenon rather than a special, problematic one."

[8] Williams (1976) examined diachronic semantic transfers of English adjectives in synaesthetic metaphors based on *OED* and *MED*, where he groups the human senses into six : touch, taste, smell, dimension, color, and sound.

[9] We cannot provide any evidence either for or against this theory, and we cannot say for certain that there is a parallelism between the two processes: sensory development and sensory evolution. The reason why there seems to be a similarity between synchronic and diachronic tendency in synaesthetic transfers is a question that we should reserve for other papers.

modified by an olfactory impression.

(9) a. hakkirishita/boyaketa nioi
'clear/dim smell'
b. ?akarui/?kurai nioi
'bright/dark smell'
c. *akai/*kuroi nioi
'red/black smell'

Example (9a) sounds no problem at all against the schema above. Further, in my speech, examples in (9b) sound more acceptable than (9c) ; the former does not sound exactly unacceptable. We will provide more discussion on the acceptability of these examples later in 4.1.[10]

In sum, although we may take it very attractive that the directionality of synaesthetic transfers shows a structure parallel to the development of the human basic senses, the empirical data do not support this assumption. Thus, we need to seek for another factor that underpins the transfer tendencies observed in synaesthetic expressions.

2.3. Accessibility Hypothesis

The last theory we review here is Accessibility Hypothesis. Examining Hebrew corpus with the results from his own psycholinguistic experiments, Shen (1997) has proposed a cognitive condition called General Cognitive Constraint as in (10).[11]

(10) General Cognitive Constraint (hereafter GCC) :[12]
A mapping from more accessible or basic concepts onto less accessible or less basic ones seems more natural, and is preferred over the opposite mapping.
(Shen 1997 : 54)

The notion of accessibility used in this constraint is underpinned by the two cognitive factors described in (11).

(11) a. The directness of the contact between the sense which perceives and the perceived entity
b. The existence, or lack thereof, of a special organ in the human body by means of which the entity is perceived
(Shen 1997 : 54)

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[10] Yu (2003) agrees with Williams (1976), examining Chinese data from contemporary novels of a writer. Yu also has, however, an empirical problem especially about transfers between scent and sight. He has observed only one transferring direction between them, i.e. the one from sight to scent, against his expectation. Although Yu may say this direction is just one of exceptional transfers, he cannot explain why no expected ones are observed between them, i.e. transfers from smell to sight modality.

[11] The Hebrew corpus, as Shen (1997) says, consisted of 130 instances of poetic synaesthesia which were taken from the writings of 20 modern Hebrew poets active during the first eighty years of the twentieth century.

[12] Shen (1997) also argues that GCC is applicable to other figurative languages such as simile and zeugma as well.

Note that the idea of accessibility here is originated from the synaesthesia analysis of Tsur (1992).

The first factor, (11a) implies that because such modalities as touch and taste (and to some extent even scent) presuppose direct contact between the perceiver and the perceived entity, they are more accessible to the perceiver ; the other modalities, i.e. sight and sound, are less accessible since they need no direct contact. The second factor, (11b), on the other hand, suggests that the tactile modality is more accessible than any other modalities because the former sense does not use a special organ to perceive a sensation unlike the latter senses (i.e. tongue, nose, eye, and ear).

Based on the two criteria on accessibility in (11), Shen presents Accessibility Hierarchy for synaesthetic transfers as follows :

(12) Shen's (1997) Accessibility Hierarchy :[13]

Touch > Taste > Scent > Sound/Sight

The sense of touch is regarded as most accessible because both of the properties of (11), i.e. direct contact with the stimulus source and the lack of a specific mediating organ, are discerned in this modality. The sense of taste comes next because it involves direct contact with the stimulus source but is mediated via a perceiving organ, i.e. tongue. The next accessible modality is considered to be scent, which, according to Shen (1997 : 55), "displays an even smaller degree of direct contact." And the least accessible modalities are sound and sight, which bear the most remote contact with the stimulus source compared with the other sensations.

With the Accessibility Hierarchy (12), Shen also notes the natural and acceptable direction of the synaesthetic transfers between the five sensory modalities. For instance, *a cold light* is much more natural than *a lighted coldness*. GCC correctly predicts the acceptability of these examples because according to (12), touch modality (i.e. *cold* here) is more accessible than sight (i.e. *light* here). This theory is convincing in that it provides cognitive factors in order to evaluate the accessibility of each sense modality to its perceiver.

However, again, certain problems are found in the treatment of scent modality. Firstly, with the cognitive factor (11a), Shen regards the olfactory modality as a more accessible one, suggesting that scent exhibits "to some extent" direct contact between the perceiver and the perceived entity (Shen 1997 : 54). This analysis, on the contrary, may jeopardize the constraint of (11a) itself, for if we follow this line of argument, we need to take the modalities of sound and sight as also showing some direct contact. In perceiving a color, for instance, direct contact would have to be assumed because the eye "directly catches reflected light" from the entity. Likewise, in perceiving sound, the ear is considered as having direct contact with sound wave emitted from an acoustic stimulus source. In other words, in order to maintain the factor of (11a) legitimate, the factor should be supposed as a constraint about whether we need to contact directly with the stimulus "source," rather than the stimulus itself ; therefore, the

[13] In this hierarchy "A>B" means that "A is more accessible to the perceiver than B."

sensory modality of scent should be supposed as not satisfying the condition of (11a) because it shows no direct contact with the stimulus source. Otherwise, the cognitive factor (11a) would be unserviceable for the hierarchical order of sensory modalities.

Next, Shen's hierarchy indicates that the scent sensation can be transferred onto sight or sound because the former is more accessible than the latter. However, as shown in the previous subsections (see examples (5) and (6), for instance), such transfers are not likely to arise in the synaesthetic transfers as in the following English and Japanese examples:

(13) a. *a fragrant light
b. ?an fragrant sound

(14) a. *kaguwashii iro
'fragrant color'
b. ?kaguwashii oto
'fragrant sound'

In sum, the problem with previous studies may be briefly summarized as in (15):

(15) The previous theories lack the proper account of why the concepts related with the sense of smell are not likely to be transferred onto those of sight or sound.

In what follows, we first present a hierarchical schema for synaesthetic transfers in section 3 with a refinement of Shen's (1997) idea of accessibility hierarchy outlined above. Then in the subsequent section, with the alternative hierarchy we will show that Shen's GCC in (10) properly accommodates the directional tendency observed in synaesthetic expressions.

3. Proposal

What is missing in Shen's (1997) accessibility account above is a factor of the identifiability of a stimulus source. To clarify this point, let us first have a look at Shen's two conditions again, which are supposed to motivate his accessible hierarchy. Let us cite them again as (16) below:

(16) a. The directness of the contact between the sense which perceives and the perceived entity
b. The existence, or lack thereof, of a special organ in the human body by means of which the entity is perceived

For the event of perception, it is natural to suppose that (at least) following three properties are inherently included: (i) a perceiver, (ii) a perceived entity, and (iii) the relation between them, i.e. the way the former perceives the latter. Factor (16a) is concerned with the third property, and factor (16b) is about the first property, i.e. a characteristic of the perceiver's. As one may notice here, however, no attention is paid to the second property in Shen's model. Our proposal is that a perceived entity, i.e. the second property, also affects the hierarchy of synaesthetic transfers along with the other two properties of perception. More precisely, the difference of whether or not the stimulus source of perception shows an identifiable property is also crucially reflected onto the accessibility hierarchy of five basic sensory modalities.

The third factor, which is called here the identifiability of a stimulus source, is described as in (17) :

(17) The perceiver can identify the source of stimulus.

In the light of (17), tactile, gustatory, and visual modalities are regarded as highly accessible to the perceiver because it is impossible to obtain these impressions without identifying where the sensations are emitted from. On the other hand, olfactory and acoustic modalities require no restriction like that ; we can perceive some smell or sound without recognizing the stimulus sources. Thus, with regard to (17), the senses of scent and sound are regarded as less accessible than those of touch, taste and sight.

Table 1 below summarizes the way each of the three factors of accessibility is marked to each basic sensory modality, and this table generates a new schema for accessibility hierarchy of five basic senses as in (18).

<Table 1> Accessibility Hierarchy of the Five Basic Sensory Modalities

Factors of Accessibility	Touch	Taste	Sight	Scent	Sound
Direct Contact (16a)	✓	✓			
Lack of the Special Organ (16b)	✓				
Identification of the Source (17)	✓	✓	✓	?	?

(18) An Alternative Accessibility Hierarchy :
Touch > Taste > Sight > Scent/Sound

In (18), unlike the other hierarchies outlined above, the sense of scent is ranked as least accessible. This configuration of the hierarchy results from the fact that the sense of sight satisfies the third factor of accessibility, and as a result, this sense has ascended in the accessibility hierarchy.

A real drawback of the previous studies outlined above may be that without scrutinizing the characteristics of scent, they situates the sense of scent in the middle of the hierarchy, being guided by an intuition something like “Given that touch is a primitive sense and that sight and sound are perceived by the advanced organs, scent must be coming around the middle.” However, the empirical data does not follow such an assumption, as pointed out in section 2. The third factor of (17) helps to elucidate another natural class consisting of the senses of touch, taste and sight in the five basic senses. In the next section, we attempt to prove that the hierarchy of (18) can deal with that problematic data for the previous hierarchical models.

4. Discussion

This section will discuss the directional tendency of synaesthetic transfers in terms of GCC with special attention to scent modality. We will show that the new accessibility hierarchy (18) gives us a proper solution for the problem (15) above. Let us recite it here as (19).

(19) The previous theories lack the proper account of why the concepts related with the sense of smell are not likely to be transferred onto those of sight or sound.

This problem has to do with two mapping relations: one is between scent and sight, the other between scent and sound. We will discuss them in 4.1 and 4.2, respectively. In 4.3, we will point out a further implication of the new accessibility hierarchy, which is concerned with transfers between sight and sound.

4.1. Scent and Sight

Let us start our discussion with the relationship of synaesthetic transfers between the senses of scent and sight. The new hierarchy (18) indicates that the scent modality is regarded as less accessible than that of sight. This implies that a visual expression is hardly employed to describe the olfactory impression. This assumption is supported by the following examples from English and Japanese:

(20) a. *a fragrant light
b. *a stink color

(21) a. *kaguwashii akari
'fragrant light'
b. *kusai iro
'stink color'

Likewise, in the light of GCC, the hierarchy captures the fact that the opposite relationship, i. e. that from sight to scent modality, is favorable, since the former is ranked lower than the latter in our accessible hierarchy. This is exemplified in (22) and (23).

(22) a. a clear smell
b. a bright fragrance

(23) a. hakkirishita nioi
'clear smell'
b. sunda kaori
'transparent fragrance'

In sum, the new accessibility hierarchy can properly accommodate the directional tendency of synaesthetic transfers between scent and sight in terms of GCC.

While this paper focuses on establishing a hierarchy for the directional tendency of synaesthetic transfers, one might wonder why such expressions as *a **red/*black smell* are unacceptable; these examples show a favorable directionality from sight to scent. It should be noted here that members in a sensory category are not homogeneous as to their potentiality to be utilized for a source of synaesthetic transfers. Consider the following examples in English and in Japanese:

(24) a. a *red/*black smell
b. a ?bright/?dark smell
c. a clear smell
d. a dim smell

(25) a. *akai/*kuroi nioi
'red/black smell'
b. ?akarui/?kurai nioi
'bright/dark smell'
c. hakkirishita nioi
'clear smell'
d. boyaketa nioi
'dim smell'

In the sight modality, for instance, there are supposed to be such subcategories as color, clarity, brightness, and intensity. The acceptability of synaesthetic transfers depends on which subcategory a source concept belongs to. Tsur (1992 : 253) touches upon this point : "synaesthetic transfer is perceived as smooth, natural, genuine, … when both terms of the metaphor refer to thing-free and gestalt-free qualities," quoting an example **lily-voiced cicadas*. Examples (24) and (25) shows that the source concepts regarding clarity as in (24c) and (25c) and intensity as in (24d) and (25d) are not barred to serve as a source for synaesthetic transfers. On the other hand, the color concept as in (24a) and (25a) is not a preferable source for synaesthetic transfers. Brightness as in (24b) and (25b) comes between clarity/intensity and color concept.[14] Following Tsur (1992), the reason of this variation may be that the color concept is conceptually less schematic than other visual sensations of clarity, intensity and brightness, so that the former is too concrete to be smoothly integrated into the description of other sensory modalities. We will not go further about this matter of internal differences in a sensory modality. See Tsur (1992) for some discussion on internal differences in the basic senses.

Rather, the point that should be pointed out here is that the opposite transfer relationship, i.e. that from scent to sight, is not freely allowed regardless of what kind of scent or sight is utilized as a transfer source or a target, respectively, which is predicted by the hierarchical schema of (18). Consider the examples below :[15]

(26) a. a *fragrant/*stink red
b. a *fragrant/*stink brightness
c. a *fragrant/*stink clarity

[14] These things will happen in transfers between other sensory modalities. For instance, in sight terms, we can say *a transparent sound* but not **a red sound*.

[15] See also Sadamitsu (2005). It has clearly verified by observing and counting Japanese synaesthetic expressions concerning scent and sight on the Internet where a strong tendency of transfer from sight related concepts to scent is shown statistically. We found 15 kinds of expressions from sight to scent modality on the Internet which have more than one hundred examples, while we found only 3 in the opposite direction, i.e. from scent to sight modality.

(27) a. *kaguwashii/*kusai aka
'fragrant/stink red'
b. *kaguwashii/*kusai akarusa
'fragrant/stink brightness'
c. *kaguwashii/*kusai akirakasa
'fragrant/stink clarity'

Note that what subgroups the olfactory sense consists of are addressed in the next subsection.

In sum, the alternative hierarchy in (18), which characterizes the scent modality as least accessible and the sight modality as not least accessible, can deal with the most problematic synaesthetic transfers in the light of GCC.

4.2. Scent and Sound

In our hierarchy of synaesthetic transfers (Touch > Taste > Sight > Scent/Sound), the last two senses, i.e. the senses of scent and sound are not ranked each other ; either of them are not checked to any of three cognitive factors of accessibility as shown in <Table 1> above. This assumption is quite different from those in the literature. Recall here that the sense of scent has been regarded as more accessible (or less differentiated in Ullmann's (1951) terms) than that of sound, as shown in section 2. This subsection argues that our hierarchy properly reflects on linguistic facts concerning the synaesthetic-transfer relationship between the senses of scent and sound.

When we examine data with the transfer relationship between scent and sound, the following two characteristics are elucidated : (i) scent and sound are interchangeable, but (ii) each acceptability is fragile. To clarify the points, let us first consider the following examples.

(28) a. a(n) ?aromatic/?fragrant/?stink sound
b. a loud/?noisy/?quiet/?silent smell
(29) a. ?kaguwashii/?koubashii/?kusai oto
'aromatic/fragrant/stink sound'
b. ?urusai/?yakamashii/?sizukana nioi
'loud/noisy/quiet smell'

In (28a) and (29a), the transfer relationship from scent to sound is exemplified, while the opposite relationship is shown in (28b) and (29b). Unlike cases such as *smooth taste* vs. **delicious touch* (the relationship between the senses of touch and taste here), we could not clearly find priority between the senses of scent and sound. In addition, we cannot take the examples in (28b) and (29b) as fully unacceptable like *a **fragrant/*stink brightness* or **delicious touch*. Though examples (28) and (29) may sound strange as laymen's usages, in fact, as shown in (30) below, the synaesthetic-transfer relationship between the senses of scent and sound can be found in usages of such experts as musicians, chefs, or sommeliers.[16]

[16] Lehrer (1975) harshly points out as follows :
"There is very general agreement, among various writers (on wines), on the internal structure of

(30) a. In "Preghiera" for example, after a beautifully moulded pianissimo opening, Marshev's tone hardens palpably at louder dynamics : something of Sauer's *fragrant sound* world and sensuous tonal palette, ….

(*International Piano Quaterly*, Spring 1999)[17]

b. Relying on the special characteristics of *quiet aroma* of stove, dense and sweet taste and clear aftertaste, it has been awarded the 7th flower of wines in Sichuan Province.

(*Forgood Distillery*)[18]

The foregoing observation suggests that the transfer relationship between the senses of scent and sound should not "forcibly" be ranked each other like the synaesthetic hierarchies observed in section 2. To fully demonstrate that our hierarchy is legitimate, we need to show that the sense of sound is ranked higher than that of sight like the relation of scent to sight. This will be the topic of the next subsection.

Before moving onto the next section, finally, let us consider a commonality between the senses of scent and sound. This observation supports our idea of ranking the two senses together as the least accessible senses in the sensory hierarchy. In the previous section, we suggest that the third factor of the identifiability of a stimulus source serves as illuminating a new distinction among the five basic senses : (i) touch, taste and sight, and (ii) scent and sound. In fact, the members of the latter class share a property of the scarcity of expressions proper to their modalities. Thus, for instance, we can easily cite subcategories proper to the category of taste such as sweet, bitter, salty, hot, sour, and so forth. However, the subcategories proper to the modalities of scent and sound are severely limited compared to those of touch, taste and sight : for example, for scent, fragrant/aromatic and stink, and for sound, loud/noisy and quiet/silent.

Because of this, when we need to discern a type of the scent and sound, we are forced to specify the source with a modifier like *a smell of fish, an aroma of coffee, a fragrance of rose,* or *a sound of airplane/gun/piano*. In other words, these two senses are considered as having a commonality of having no subgroup inherent in the categories, unlike the other senses.[19] It would be not illegitimate to assume that this peculiarity observed in the two senses of scent and smell is reflected in the synaesthetic hierarchy as sharing the rank together.

4.3. Further Implications : Sight and Sound

This subsection discusses the transfer relationship between the senses of sight and sound. We argue that linguistic data support our hierarchy (Touch > Taste > Sight > Scent/

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vocabulary. And there is a considerable self-consciousness in the choice of terms among some writers." (Lehrer 1975 : 901)

[17] http://www.olegmarshev.com/reviews/review21.htm

[18] http://www.forgood.com.cn/doce/qyjs.asp

[19] As for subgroups of sight, there are color, intensity, brightness and clarity ; for touch, intensity, heat, smoothness, hardness, pressure, and intensity ; for taste, sweet, bitter, salty, hot, and sour.

Sound) that assumes that the transfer from the sight to sound is preferable. Consider the following examples:

(31) a. a transparent/clear/bright sound
b. sunda/hakkirishita/akarui oto
'transparent/clear/bright sound'

(32) a. a *noisy/*silent color
b. *urusai/??shizukana iro
'loud/quiet color'

The contrast in the acceptability between (31) and (32) clearly shows that a directionality of synaesthetic transfer is immanent in the relationship between the senses of sight and sound: while a visual sense can be utilized to describe an acoustic impression, the acoustic sense is not employed for expressing a visual sensation. This fact indicates that the sense of sound is also regarded as ranked higher than that of sight like the sense of scent as indicated in the previous subsection.

In section 2, we pointed out that the previous studies have difficulty in dealing with the transfer relationship between the sight and scent, since they wrongly situates the former sense in a higher position of the hierarchy than that of the latter sense. Here, the same criticism can be extended to the case of the relationship between the senses of sound and sight. Ullmann's hierarchy (2) in section 2.1 (Touch < Heat < Taste < Scent < Sound < Sight) indicates that a sound expression could serve as a source for a synaesthetic transfer to the visual description. But this is not the case as shown in (31) and (32). Ullmann (1951) gives a tentative explanation for this "unexpected" directionality, noting "Visual terminology is incomparably richer than its auditional counterpart, and has also far more similes and images at its command" (Ullmann 1951: 283). While claiming that the parameter of "differentiatedness" dominates his hierarchy of synaesthetic transfer, Ullmann switches the focus of argument to the quantitative problem when his idea does not work. Rather, the parameter itself that ranks the sense of sight higher than those of sound and scent should be considered as illegitimate for a dominating factor of synaesthetic transfers.

In addition, Shen (1997), seeking for a universal tendency of synaesthetic transfer, has provided no substantial discussion for the transfer relationship between the senses of sound and sight. His accessibility hierarchy of Touch > Taste > Scent > Sound/Sight in (12) suggests that no directionality is observed between the senses of sound and sight, since these two sense are ranked together as least accessible. However, this assumption is not endorsed by the linguistic facts as shown in (31) and (32).

Before closing our argument, let us make a note on metaphor and metonymy, and our foregoing argument. Just one thread of research on synaesthesia focuses on the issue of whether synaesthetic transfer is motivated by either metaphor or metonymy, or by both although Ullmann (1951: 277) has already pointed out that two senses can be "interlinked by similarity or contiguity, or even both at the same time" (cf. Marks and Bornstein (1987), Komori (1993, 2000) and Muto (2000) among others). Yamaguchi (2003), for instance, argues

that synaesthetic expressions are conceptually integrated not only by metaphorical but also by metonymic transfer. Then, repeating Komori's and Muto's arguments, he considers that when, for example, someone hits a frying pan, a synaesthetic expression like *a hard sound* is regarded as an instance of metonymic transfer because such an expression is uttered when the perceiver conceptually foregrounds a contiguity relation between the acoustic impression emitted from the stimulus source and a tactile characteristic inherent in that stimulus source (i.e. the hardness of the frying pan). On the other hand, *a warm color* is regarded as an instance of metaphoric transfer. This is because the expression is employed when the visual impression that the perceiver currently obtains is likened to a tactile reaction that things with a similar visual impression such as fire or the sun generally brings.

What needs to be clarified here is that the metaphor/metonymy analyses for synaesthesia are conducted with a presupposition that there is a directional tendency among synaesthetic expressions, consulting synaesthetic hierarchical schemas presented by previous researchers such as Ullmann (1951) and Williams (1976). On the other hand, the point of this article is that these hierarchical schemas previously presented need to be modified. In other words, the former researches focus on the issue of what conceptual mechanisms produce synaesthetic transfers, whereas the latter study addresses the issue of what regularities (i.e. hierarchical schema) synaesthetic transfers produce. Needless to say, both types of the researches are required to comprehensively understand the phenomenon of synaesthesia. Therefore, this article is considered as complementary to those discussing what cognitive mechanisms should be assumed in synaesthesia.

5. Conclusion

This paper has explored the directionality of synaesthetic transfers. We argued that the transfer directionality observed in synaesthesia should be presented as Touch > Taste > Sight > Scent/Sound, which was shown in (18). In section 2, we first pointed out that the hierarchical schemas previously proposed do not properly reflect on the transfer tendency of synaesthetic expressions, suggesting that the deficiencies result from their improper ranking of the sense of scent in the hierarchies. Then, in section 3, we presented an alternative hierarchical schema for synaesthetic transfers. It was shown that this alternative schema is extracted by assuming a new cognitive factor for the accessibility hierarchy that Shen (1997) originally presented. What was elucidated with this factor referred to as the identifiability of a stimulus source was the fact that among the five basic senses, there is a distinction between the senses of touch, taste and sight and those of scent and sound. With the introduction of this factor into the ordering in the accessibility hierarchy, it was indicated that the sense of sight, which has been regarded as least accessible, is in fact ranked lower than those of scent and sound. Section 4 argued that our new schema could handle the problems that the previous studies exhibited, verifying that it legitimately reflects on directional tendencies observed between the senses of scent and sight, between those of scent and sound, and between those of sight and

sound in the light of GCC.[20]

As mentioned in the last part of the previous subsection, our research here is considered as complementary to another thread of research on synaesthesia that discusses what cognitive mechanism triggers the semantic phenomena of synaesthetic expressions. We need to clarify more fundamentally how such cognitive mechanisms as metaphor and metonymy affect the directionality of synaesthetic transfers. This task, however, will be beyond this paper and we have to await further research.

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[20] In addition, along with the same line of Sadamitsu (2005), the statistic verifications on the other transfers have been being conducted.

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