1998. , Language and Literature. Vol. 7(2). 123-140.

How come silence is sweet but sweetness is not silent: a cognitive account of directionality in Poetic synaesthesia

YESHAYAHU SHEN
MICHAL COHEN

TEL-AVIV UNIVERSITY
ISRAEL

Address for correspondence:
Dr. Yeshayahu Shen
Dep. of Poetics & Comparative Literature
Tel Aviv University
69978 TEL-AVIV
ISRAEL
E-mail: YSHEN@TAUNIVM.BITNET
Fax: 972-3-6408980
Tel: 972-3-6408711

How come silence is sweet but sweetness is not silent: a cognitive account of directionality in Poetic synaesthesia

YESHAYAHU SHEN
MICHAL COHEN

TEL-AVIV UNIVERSITY
ISRAEL

ABSTRACT

Synaesthesia (e.g., 'sweet silence') consist of the mapping of properties from one modality to another. The present article introduces a cognitive account regarding *the directionality of the mapping* in poetic discourse. Firstly, we suggest that mapping from lower modalities onto higher ones (e.g. from 'touch' onto 'sight') is more frequently used in poetic discourse than the opposite mapping (i.e., from higher to lower modalities). The findings of a textual analysis of a large scale poetic corpus are introduced, which support this proposal, and reveal that the 'low to high' mapping is more frequently used than its inverse, and that this tendency is a universal one (across national boundaries and historical periods).

Secondly, we propose a cognitive account for this universal tendency according to which the 'low to high' mapping conforms (while its inverse violates) to the following cognitive constraint: *mapping from a more accessible concept onto a less accessible one is more natural than its inverse.* The findings of an interpretation experiment are introduced, which provide some support for this account by suggesting that the more frequently used structure (i.e. the mapping from the more accessible to the less accessible sense) is easier to comprehend than its inverse.

We conclude by proposing that aspects of poetic language are themselves constrained by general cognitive constraints.

Key words: cognitive poetics; cognitive constaints; cognitive linguistics; empirical study of literature; figurative language; metaphor; metaphor comprehension; poetic figures; poetic synaesthesia; synaesthesia.

1. Introduction

Recent studies of human cognition during the last 15 years or so have convincingly argued that figurative modes of thinking such as metaphor, analogy, and personification, are not restricted to poetry; furthermore, the argument is that these figurative modes play a central role in ordinary human cognition and, in particular, in such areas as ordinary language use and conceptual organization. For example, Lakoff and many of his followers (notably Ray Gibbs [1994]) have convincingly argued that various modes of language and thought traditionally associated with poetic discourse, notably metaphor, constrain and structure many major aspects of our ordinary, common, non-poetic usage of language and thought. The very title of Gibbs' recent book, *The Poetics of Mind*, beautifully illustrates this view. In essence, this view maintains that our conceptual system is metaphorically structured and that cognitive processes, such as concept formation, reasoning, inferencing and the like, are metaphorically constrained. We think of abstract concepts, for example, 'love' in metaphorical concrete terms such as a 'journey' as revealed by expressions as *we have reached a crossroad in our relations, let's change direction a*nd so on. These are the metaphors we live by according to Lakoff and Johnson (1980).

The currently received view maintains that various modes of thinking, traditionally attributed to poetry, constrain ordinary human cognition. What we would like to propose here is a complementary perspective, namely, that in addition to the fact that human cognition is constrained and structured by modes of language traditionally associated with poetic discourse, as previously shown, *aspects of poetic language are themselves constrained by cognitive principles.* In other words, even the creative and novel use of the language of poetry conforms, at least partly, to some general cognitive constraints. Furthermore, such a view may provide a reasonable explanation for the observation that despite the creativity and novelty manifested in poetic language (which results in its characteristic intricacies and complexities as literary critics would argue), some semantic aspects of poetic language are rather systematic and constrained. It may very well be the case that it is this adherence to (cognitive) constraints which guarantees the interpretability of poetic language. Thus, these cognitive constraints, while allowing a certain amount of 'freedom' for poetic language, guarantee its

interpretability by minimizing the use of other options (for a related view, see Lakoff & Turner 1989).This general framework (see also Shen 1995; 1997) serves as the theoretical background to the present article; its main goal is to provide a detailed illustration of the above line of argument by analyzing a specific 'figure' - the *synaesthesia*. We should point out, however, that the same general theoretical arguments apply equally to several other figures such as simile and zeugma as has been suggested by the first author (Shen 1997).

A synaesthesia is a metaphorical expression in which the source and target domains represent concepts belonging to two different modalities or senses. Thus, in *a sweet silence*, the mapping proceeds from the 'taste' domain, onto the domain of 'sounds'. This phenomenon has for a long time attracted the attention of researchers in various disciplines such as literary critics, linguists, cognitive psychologists, developmental psychologists and others (see Ullmann 1957, Marks 1982, Osgood 1980, Tsur 1992).

The study of synaesthesia has typically focused on questions such as: what is the basis for finding similarities between two concepts belonging to two distinct senses; or: to what extent is this phenomenon universal, are there any differences between poetic and non poetic uses of synaesthesia, and when is the ability to interpret synaesthesia developed (see e.g., Marks 1982; Osgood 1980). However, most of these studies have ignored an important question, that of *the directionality of mapping*. The question is whether the directionality of the mapping is used in a principled way, or whether any modality can be mapped onto any other (given that a synaesthesia consists of the mapping of properties from one modality [sense], the source modality to another, the target modality). This, of course, is an empirical question that has to be answered on the basis of a textual analysis of a large poetic corpus. If directionality in synaesthesia is used in a principled way, as indeed we will argue, the question that immediately arises concerns the rule-governed behavior of synaesthetic metaphors. In response, we will argue, on the basis of some empirical findings, that poetic synaesthesia conforms to a *cognitive constraint* which limits the use of certain options with respect to directionality while favouring others. In what follows we will first summarize (in section 2) the main findings of a textual analysis of a sample of poetic synaesthesia conducted in two previous studies (Ullmann 1957, and Shen 1997). We will then turn (in section 3) to a cognitive account for this generalization and introduce some empirical findings obtained in a

free interpretation experiment. We will conclude by discussing some of the implications of the present study vis-a-vis the relationship between poetic language and cognition.

2. Directionality in the structure of the poetic synaesthesia

2.1. The two structural options: low to high or high to low mapping

It is commonly assumed (see e.g., Ullmann 1957, Tsur 1992 inter alia) that the modalities are organized along a scale, ranging from the 'highest' modality - SIGHT, followed (in this order) by SOUND, SMELL, TASTE, to the 'lowest' sense, namely, TOUCH. Some linguistic evidence for the validity of this scale is introduced in Williams (1976)'s study of diachronic changes in word meanings in English and Japanese, which turns to be highly sensitive to this scale. (We will turn back to Williams' study in section 3). Given this scale, or hierarchy, any given synaesthesia exhibits either a mapping from a low to a high modality or vice versa. Compare, for example, the following two instances of synaesthesia:

[1a] *A sweet silence*
[1b] *A silent sweetness*

In [1a] the direction of mapping from source to target represents a low to high mapping: the source term (i.e., the adjective *sweet*) belongs to a lower modality on the above scale than the target *silence*, namely, *TASTE* and *SOUND*, respectively. By contrast, [1b] represents the opposite directionality: from a higher to a lower modality. Given these two basic structural options, the question of directionality in poetic synaesthesia can be formulated in a more precise manner: Do *poetic* synaesthesias (i.e., synaesthesias occurring in poetic discourse) make use of one of these two options more frequently than the other, beyond a specific context; or put differently: is there a universal preference for one of the options over the other? This, clearly, is an empirical question which has to be answered on the basis of a textual analysis of a large poetic corpus. Note, that we are not looking at potential differences (or similarities) between the poetic vs. the non-poetic use of synaesthesia (as might be suggested by the term 'poetic synaesthesia'). Rather, we are here concerned with the question: do poetic synaesthesias exhibit any general pattern of preference beyond specific contexts, for one structural option over another, equally 'acceptable', option?

Since this question concerns preferences between options potentially employed in poetic language, the relevant standard is not the distribution of these options within non-poetic language, but, rather, the *chance level*. That is to say, if the analysis yields significantly higher preferences for one option over the chance level (as indeed is shown), then this is a meaningful and significant result, regardless of whether we compare it to non-poetic uses of the figures in question, or not.

Adopting the chance level as the standard of comparison of the distribution of synaesthesias in poetry implies that one can describe the systematic distribution of such structures in poetry, without any reference to whether non-poetic language does, or does not, yield the same pattern. We may, of course, at a later stage, seek a similar characterization of synaesthesias in non-poetic discourse, but this is beyond the scope of the present article.

The generalization stemming from an extensive field research into poetic synaesthesias, initially proposed by Ullmann (1957: 280), is:

> ***Poetic synaesthesia systematically prefers to map terms representing lower modalities onto terms representing higher ones, rather than vice versa.***

The evidence supporting this generalization come from two main sources: Ullmann's study of European poetry, and an analysis of Hebrew poetry reported in Shen (1997).

2.2. Ulmann's study of European poetry

Ullmann (1957), in a seminal study on the topic of synaesthesia, sampled over 2000 synaesthetic metaphors which were extracted from the texts of 8 canonical corpora (mainly poetic) from three different European literary sources: English, French and Hungarian poetry. Analysis of this large corpus revealed a clear-cut tendency (with a relatively small number of exceptions) for the use of synaesthetic metaphors conforming to the above generalization over those which violate it. It is obvious (although Ulmann himself is not explicit on this point) that this tendency becomes even more marked, if one takes chance distribution as the standard of comparison.

It is noteworthy that there is a single exception to this generalization, which relates to the two highest modalities (i.e., SIGHT-SOUND). Ullmann points out that when a synaesthesia

consists of these two senses, each one of them is equally likely to become either the target or source concept. The reason for this is not clear, though Ullmann himself as well as other researchers (e.g., Tsur 1992) have provided some initial suggestions.

2.3 Evidence from Hebrew Poetry

In order to find out whether this generalization can be extended to other non-related corpora, Shen (1997) analyzed another 130 synaesthetic metaphors drawn from modern Hebrew poetry. This corpus introduces a different set of poets belonging to a totally different cultural environment and to a different period (the twentieth century rather than the nineteenth). This corpus 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 this century. The poets chosen represents four distinct historical periods in the evolution of Hebrew poetry, periods which, as previously mentioned, differ substantially with respect to their ascribed poetic characteristics.

The rationale underlying this analysis, which is admittedly highly irregular in studies of literary theory is briefly explained here. In response to the question, what justifies the generalization from tendencies of a given poetic corpus to poetry in general, we mention two factors characterizing the corpus analyzed which may enable the validity of the conclusions drawn here to be extended to 'poetic synaesthesias' at large. The corpus under consideration comprises synaesthesias taken from diverse poems and poets, as well as different stages in the history of Hebrew poetry. Each of those corpora represents a unique context which is markedly different from each of the other contexts represented by the other corpora. It is thus reasonable to assume that the structural pattern emerging from this analysis could not be attributed to contextual factors, such as the particular poem from which the synaesthesias were excerpted, or to the individual poet who composed them, or to the particular 'generation' or 'school of poets' with which a given poet is affiliated, and so on. The fact that the four poetic corpora (the three analyzed by Ullmann and the one reported here) cover four national literary corpora, provides even stronger support for the generalization proposed. Therefore, there is no reason to assume that any specific contextual factor (regarding the specific poems from which the synaestheisas were taken, or the specific poet, or the specific poetic school, or the historical stage, or even the national poetry) affects the pattern of selection of the 'low to high' mapping shared by the Hebrew (as well as the European) sample.

Similar considerations have motivated other studies of poetic figures, employing a similar methodology (see, for example, MacKay's 1986 study of poetic personification, Shen's 1987 study of the poetic oxymoron; see also Shen [1995], 1997, for elaboration on this point]).

It should be noted that the various Hebrew corpora belonging to different periods in the history of Hebrew poetry, do not simply represent four *different* historical periods in the evolution of Hebrew poetry, but also indicate four periods which somehow stand in marked opposition to one another in so far as their ascribed poetic characteristics are concerned. This results from the well known ‘struggle’ between generations in poetry, characterizing literary evolution in general. It would, therefore, be reasonable to assume that poetic tendencies allegedly prevailing in a given period are likely to be rejected by the producers of a subsequent period, and their strategies will in turn be rejected by those of the next period. Thus, the various corpora which appear to be antithetical to each other allegedly exploit a large scale of existing options at their disposal regarding the structuring of poetic metaphor across particular poetic contexts.

The results were straightforward. Of the 130 cases, 95 (75%) were in accordance with the above generalization (e.g., *a cold taste’*and *a sweet smell*); 23 (18%) were neutral with regard to the generalization (they consisted of the ‘sound-sight’ combination, as in *a silent whiteness* and *the music of the lamp's light*) and in only 10 cases (7%) were they inconsistent with the generalization (e.g., *a green smell and a noisy sweetness*). A binominal test revealed that the instances of synaesthesia found in our sample exhibit a preferred directionality, as was hypothesized above, i.e., the two senses do not appear to map randomly. Rather, the lower terms in the hierarchy tend to map onto the higher terms significantly more than the other way around ($p<0.001$). This clear cut result strongly suggests that despite the relatively limited nature of sampling conducted for Hebrew poetry, Ullmann's generalization reflects a more widespread pattern that can be extended to other literary corpora beyond the European ones.

3. The cognitive account

3.1. Introduction

How do we explain the higher frequency of of use of the 'low to high' mapping over its inverse across contexts? The account we would like to propose is a cognitive one. It suggests that the low to high structure is more *natural,* from a *cognitive* point of view, than its inverse. In this respect a synaesthesia is but a special case of a cognitive principle which applies to metaphors in general. The principle states that: ***Mapping from a more accessible concept onto a less accessible one is more natural than its inverse.*** This principle characterizes the direction of metaphorical mapping in general, as many studies have shown (see Shen 1997). For example, Lakoff and Johnson (1980), as well as Johnson (1986), have shown that the knowledge we have about concrete domains with which we have immediate contact via bodily experience, such as up down orientation, physical objects, containers and the like, is projected onto less concrete (hence less accessible) domains, rather than vice versa. This unidirectional tendency is reflected in verbal expressions we use in ordinary language. For example, we conceive of emotions by using the source domain of orientation or containers, as revealed by our use of expressions such as *I feel up/down* or *he is full of anger/fear*. This mapping is clearly unidirectional, since we do not usually conceptualize orientations or containers in terms of emotions, and therefore, there are no conventionalized expressions in language which reflect such a counter directionality.

Applying this general cognitive principle to synaesthesia may suggest that the concepts belonging to the lower senses like touch and taste, are more accessible than those belonging to higher senses like sound and sight (see also Shen [forthcoming]. What makes lower concepts such as 'coldness' or 'sweetness' more accessible than higher sensory concepts such as 'light,' is that they involve a more direct, less mediated experience of perception. In other words, the lower the modality, the more direct and immediate is the relation between perceiver and object perceived. As in the case of metaphors in general, concepts which are highly associated with immediate bodily experience are more accessible than concepts which are less so. The same logic that makes concrete concepts more accessible than abstract ones, also determines that lower sensory concepts are more 'concrete,' that is, more

accessible than higher ones. (This account develops and refines a proposal made in Shen, 1997; see also Tsur 1992 and Ulmann 1957 for an elaboration). Our proposal, then, is that the highly selective pattern of synaesthetic expression in poetry, beyond a specific context, is accounted for by assuming that the use of synaesthesia in poetry is highly constrained by the above general cognitive principle. Some linguistic data in the area of diachronic semantics, and in particular, in the domain of meaning change, support this proposal. In a large scale study of various languages (e.g., English and Japanese) conducted by Williams (1976), the direction of diachronic meaning extension of synaesthetic adjectives, such as *sharp, bitter, warm e*tc', was examined. This study yielded a universal robust pattern which can be summarized under the following rule: if a lexeme metaphorically extends its earliest sensory meaning to another sensory modality, it will always transfer from a lower to a higher modality rather than vice versa. For example, if a touch-word transfers, it may transfer to taste (as in '*sharp tastes'*), or to sound (*soft sound*). Taste words do not transfer back to tactile experience, but rather to higher modalities, as smell (as in *sour* or *sweet smells*), or to sound (as in *sweet sounds*). This is a universal tendency that applies to diverse languages such as English and Japanese. We take this linguistic finding as an indication, supporting the claim that lower sensory domains are more accessible and therefore more readily used as sources of meaning extensions, than higher sensory domains. (for an elaboration, see Williams 1976). Our next goal is to introduce some psychological evidence supporting this account. Note, that this account suggests that the low to high mapping represents, from a cognitive perspective, a more 'natural' or 'basic' structure than its inverse. In other words, it suggests that using our

knowledge about accessible concepts in order to understand less accessible ones, seems a more natural way to understand concepts than the other way around. Several predictions regarding comprehension and recall follow from this account:

1. The 'low to high' mapping represents a structure that will be judged as more natural than its inverse.

2. The 'low to high' structure will be better recalled than its inverse.

3. The 'low to high' structure will be easier to comprehend than its inverse.

Shen (1997; forthcoming) introduces some empirical evidence supporting the first two predictions. Our next goal is to introduce empirical evidence supporting the third prediction.

3.2. The 'low to high' structure is easier to comprehend than its inverse

A third prediction that follows from our general account is that the 'canonical structure' should be easier to comprehend than its inverse. Note, that while this prediction is fully compatible (and even derivative) of the previous finding, more direct evidence is required to substantiate this claim. In order to examine this prediction, we asked subjects to generate interpretations of synaesthesias they read. The advantage of this task, (compared with the naturalness judgement and recall tasks previously used in Shen 1997; forthcoming), is that it may provide a more direct insight into to the way subjects comprehend, in a (relatively) natural setting a given synaesthesia. Such a task may then shed additional light on the complex process of comprehension of synaesthesia. Let us describe the interpretation generation experiment.

The experiment

Subjects

Sixteen adults (8 males and 8 females) voluntarily participated in the experiment. Six of them were high school graduates, while the remaining ten had a B.A. degree. Their age ranged between 22-30. All of them were Hebrew native speakers.

Materials:

A list of 20 novel synaesthesias was constructed. All of them were noun phrases, consisting of a modifier (an adjective) representing the source domain and an head (noun) repesenting the target domain. Half of the synaesthesias constructed conformed to the 'standard directionality' (according to Ullmann's scale), namely, their source concept (the adjective) represented a lower modality than their target (the head [noun]), as in: *a sharp silence*; while the other half reflected a 'non-standard directionality', that is, their source concept represented a higher modality than their target, such as *a silent sharpness.* The novel synaesthesias were judged by two independent judges (graduate students from Tel Aviv University) as novel (rather than conventional) expressions. The two judges had to decide, based on their intuition, for each synaesthesia, whether they are familiar with that phrase. Only those expressions that were considered by both judges to be novel synaesthesias were included in the list. For each of the 20 synaesthesias in the original list a corresponding 'inverted' synaesthesia was constructed, resulting in another 20 synaesthesias. Thus, for the 20 original examples of synaesthesia conforming to the standard or non-standard directionality, there were 20 synaesthesias with the identical components but in inverse positions (e.g., *sharp silence,* i.e. a standard directionality synaesthesia, in the original list corresponded to *silent sharpness* in the constructed list). On the basis of these two lists (the original and its corresponding 'inverted' one), two new sets of synaesthesias were constructed (see Table 1).

Table 1: A selection of the two lists of synaesthesia

Set 1:	***Set 2:***
White coarsenness	Coarse whiteness
Blue coldness	Cold blueness
Warm greenness	Green warmness
Sharp silence	Silent sharpness
Fragrant purple	Purpled fragrance
Sour greenness	Green sourness
Soft quietness	Quite softness
Rustling light	Lighted rustle

Set 1 consisted of the first 10 synaesthesias in the original list, and the 10 last synaesthesias in the 'inverted' list; Set 2 consisted of the remaining synaesthesias in the original and the inverted lists. Each of the two sets of synaesthesia thus contained examples identical in their

components to those included in the other set but in inverse positions. Half of the synaesthesias in each set conformed to the ‘standard directionality’ (e.g., *sharp silence)* while the other half conformed to the ‘non-standard’ directionality (e.g., *silent sharpness*). The two lists were thus counterbalanced.

The synaesthesias were ordered so as to appear alternately in each set: a ‘standard directionality’ synaesthesia was followed by a ‘non standard’ directionality synaesthesia.

Each set comprised one of the two versions, A and B of the questionnaires used in the experiment.

Procedure:

Each subject was given one of the two versions of the questionnaires (all in all, 8 subjects were given version A, and 8 were given version B).

The instructions the subjects received were as follows:

‘Following is a list of expressions taken from poetry. You are requested to interpret each one and to explain its meaning (no expression has one 'authorized' interpretation). Some of the expressions are difficult to understand and might seem odd and unusual. Nevertheless you are asked to attempt them all, and not to give in easily. Your effort is very important for the outcome of the experiment.’

No time limitation was imposed, although each subject was told that it was unnecessary to devote more than 10 minutes to complete the task.

Most of the subjects preferred to take the questionnaire home and to return it at a later stage, so that they could ‘work on it quietly’; a minority answered it in the presence of the experimenter.

Results:

Four types of analyses were performed on the subjects' responses. Each was supposed to provide some indication as to which of the two constructions - the ‘standard directionality’ or the ‘non standard directionality’ - is easier to understand and process.

The results of the analyses are presented below and are divided into four sections according to the different analyses.

Analysis 1

Several of the subjects failed to answer or gave incomplete answers to some of the synaesthesias. This may provide some measure of the difficulty in comprehension of the synaesthetic expressions. The first analysis simply examined the distribution of 'standard'/'non standard' synaesthesias among the set of interpreted and non-interpreted synaesthesias.
In accordance with our general hypothesis ('standard' synaesthesias are easier to interpret than 'non standard' ones), it was predicted that among the uninterpreted expressions the number of 'non standard' structures will outrank those of the 'standard' ones, while the reverse pattern was expected to characterize the interpreted responses.

Results:

Table 2 summarizes the main results.

Table 2

		Interpreted	Not interpreted	Row totals
standard directionality	Frequencies Percent of total	156 48.750%	4 1.250%	160 50.000%
non-standard directionality	Frequencies Percent of total	141 44.063%	19 5.938%	160 50.000%
	Column totals Percent of total	297 92.813%	23 7.188%	320

As can be seen our prediction was confirmed. Among the expressions which were not interpreted (23 out of 320), 19 (82.6%) were 'non standard synaesthesia' while only 4 (17.39%) were 'standard synaesthesia'. A statistical analysis revealed that this difference is significant - chi-square (df=1) 10.54, p=0012. An interesting phenomenon that fits in with the findings of this research was noticed in one of the questionnaires. The subject was found to repeat an almost continuous pattern, from the middle of the questionnaire until its end, in which he gave an interpretation to the 'standard synaesthesia' while skipping the 'non standard synaesthesia'. This behavior illustrates clearly the difficulty in the interpretation of 'non standard synaesthesias'.

Analysis 2

The second analysis relates to the adequacy of the subjects' responses. The responses were grouped into two sets, namely, ‘adequate’ vs. ‘associative’ responses. An ‘adequate response’ was operationally defined as a response in which the head noun of the participant's response explicitly refers to either the head noun or the modifier (the adjective) of the original synaesthesia. For example, in response to the synaesthesia *a sharp silence* one of the participants wrote: ‘the silence preceding a storm’, a response which was classified as an adequate one since the head noun of the original synaesthesia (‘silence’) appears explicitly in the response.

In contrast, an ‘associative response’ was considered any failure to meet this criterion (cases in which the head noun of the response refers to neither the head noun nor the adjective of the synaesthesia, but to some entity which is related to the former by an associative link). For example, in response to the synaesthesia *a silent sharpness* one participant wrote: ‘an accusing look’, a response which does not contain either the head noun or the modifier (the adjective) of the original synaesthesia. Another example is the synaesthesia *dark coolness*, to which one of the subjects responded: ‘a feeling of loneliness and emptiness’.

This analysis aims at determining the correlation between the ‘standard’/’non standard’ distinction and the number of ‘adequate’ vs. ‘associative’ responses. In accordance with our general hypothesis it was predicted that the number of non standard structures would outrank the number of standard ones among the ‘associative’ responses, while the reverse pattern would be found among the ‘adequate’ responses. The rational underlying this prediction is that a synaesthesia whose interpretation is less available, would tend to generate more associative responses than a synaesthesia whose meaning is more available. The reason for that is that ‘drifting’ to associativeness is, presumably, a means of avoiding giving a binding interpretation. We assumed, then, that if there is a relatively straightforward way to interpret a given expression, the subjects would tend to generate that interpretation rather than resort to a more associative one. Thus, the extent to which subjects tend to generate an adequate/associative response can serve as an indicator of ease or difficulty of interpretation.

Scoring

Two independent judges (undergraduate students at Tel Aviv University) classified the responses into one of the two categories (‘adequate’ or ‘associative’). Both were trained to identify a given response as belonging to either category, by analyzing several examples from each category. Each was presented with the entire list of responses, and asked to classify them into the above two categories. Agreement between judges reached a level of about 80%. After discussing the disagreements, the judges reached a level of about 90% of agreement.

Results:

Table 3 summarizes the main results.

Table 3

		Adequate	Associative	Row totals
standard directionality	Frequencies	113	43	156
	Percent of total	38.047%	14.478%	52.525%
non-standard directionality	Frequencies	80	61	141
	Percent of total	26.936%	20.539%	47.475%
	Column totals	193	104	297
	Percent of total	64.983%	35.017%	

The data showed that the prediction set out in the above is confirmed: out of 104 associative responses, 43 (41.3%) belonged to ‘standard synaesthesias, while 61 (58.65%) belonged ‘non standard synaesthesias’. A chi-square analysis showed this difference to be significant: (df=1), p=.0046. This result suggests that ‘standard’ synaesthesia are easier to interpret than their ‘non standard’ counterpart, a result that agrees with the proposed hypothesis.

Analysis 3

The purpose of this analysis was to determine the extent to which the subjects' responses preserved the original topic of the synaesthesia they had interpreted (i.e., the latter's head noun). An interesting phenomenon that occured in some of the subjects' responses was that in some cases the topics of the responses did not correspond to the original ones, but rather the original modifier of the synaesthesia had entered the topic slot of the response. We shall call the former ‘preserving responses’ and the latter ‘inverting responses’.

For example, in response to the synaesthesia *hot music*, one of the subjects wrote: ‘music which expresses passion’, in which the original topic (‘music’) and its corresponding modifier (‘hot’) have preserved their respective positions.

An example of an ‘inverting response’ is a response given by one of the subjects to the synaesthesia, *voiced sweetness*; that subject wrote: ‘a sweet and pleasant voice’, which represents a reversal of the original topic (‘sweetness’) into the modifier position in the response, and the original modifier's (‘voiced’) movement into the topic position of the response. Note, that by giving ‘inverted responses’ to non standard examples, informants turn the non standard cases into stnadard ones.

Our goal, then, was to examine the distribution of ‘standard’ vs. ‘non standard’ synaesthesias among both the ‘preserving’ and among the ‘inverting’ responses of the subjects. In general, we assumed that subjects would choose as a default strategy, to preserve the original topic rather than to invert it. Given this default bias, we predicted that among the responses to the ‘standard structure’ there will be a stronger preservation of the original topic, than its inverse, and that the tendency to inverse them will be correspondingly smaller than in the ‘non standard’ structure. The main prediction, however, was that the ‘standard’ responses will outrank ‘non standard’ ones among the ‘preserving responses’, while ‘non standard’ responses will outrank ‘standard’ ones among the ‘inverting responses’. The rational underlying this prediction was that attempts (on part of the subjects) to interpret less interpretable structures, would yield more frequent inversions and changes than attempts to interpret more interpretable ones; the reason for that is, presumably, that the former cannot be easily interpreted, which require the subjects to make some changes instead of adhering to the default strategy one would expect them to conform to, along their attempt to come up with a reasonable interpretation. In order to perform the analysis it was necessary, as might be expected, to exclude the associative responses (see analysis 2) - those in which it was not possible to determine whether the adjective or the noun was taken by the participant as the subject of the synaesthesia.

Scoring

Two judges (graduate students from Tel Aviv University) classified the subjects' responses into one of the two categories (‘preserving’ or ‘inverting’). They received some training in

marking their choices by analyzing several examples for each category. They were then presented with the entire list of responses and asked to classify them into the above two categories. The agreement between the judges reached a level of about 80%. After discussing the disagreements, the judges reached a level of 100% of agreement.

Results:

Table 4 summarizes the main results.

Table 4

		Topic retained	Topic inverted	Row totals
standard directionality	Frequencies Percent of total	112 58.031%	1 .518%	113 58.549%
non-standard directionality	Frequencies Percent of total	56 29.016%	24 12.435%	80 41.451%
	Column totals Percent of total	168 87.047%	25 12.953%	193

Out of a total number of 297 responses, only the 193 previously judged to be 'adequate ones' (see analysis 2) were analyzed. Among these 193 responses, 168 (87%) were classified as 'preserving responses', while only 25 (12.9%) were considered 'inverting ones'. Recall that our first prediction was that among the preserving responses 'standard synaesthesias responses' (i.e., responses to standard synaesthesias) are expected to outrank 'non standard responses'. Indeed, we observed that out of the 168 preserving responses 112 (66.6%) were 'standard synaesthesias responses', while only 56 (33.3%) were responses to non standard synaesthesias. Furthermore, 24 out of the 25 cases of 'inverted responses' (96%) were responses to non standard structures, while in only one case (4%) the inverted response was a response to a standard structure. These results clearly indicate that the 'non standard' structures tend much more to be inverted than 'standard' ones - chi-square (df=1) 35.21, p=.0000 - which we take as an indication of the former's being more easily interpretable than the latter. In conclusion, our studies demonstrate that out of the synaesthesias in which the original structure is retained the majority are 'standard', but there is also a fairly large number of 'non standard' synaesthesias in which the original structure is retained. In those instances in which an inversion occurred, there is a significant majority of the 'non standard' synaesthesia.

Analysis 4

Classification of responses

The fourth analysis deals with the degree of homogeneity and heterogeneity of the responses across subjects. Underlying this analysis is the assumption that the higher the availability of the interpretation of a given synaesthesia, the more homogeneous, that is, more similar responses it will generate, and, conversely, the lower the availability, the less homogeneous, that is, less similar will the responses be. The reason for that is that if there is a relatively straightforward way to interpret a given expression, it will be shared by more subjects than in cases no such straightforward interpretation is available. Thus, we assumed that 'anomalous' (that is, particularly difficult) metaphors give rise to a considerably larger number of different responses than less difficult ones. Thus, variability among subjects can serve as an indicator of ease or difficulty of interpretation. Our prediction is that among the responses to the 'standard synaesthesia' there will be a tendency for greater homogeneity than among the responses to the 'non standard' synaesthesia. Determining the degree of homogeneity or heterogeneity of the responses of each synaesthesia was done by dividing the responses into three categories:

1. ***Verbally similar responses.*** Responses were included in this category when they both shared at least one identical (or synonymous) predicate. Consider, for example, the following four 'verbally similar responses' given to the synaesthesia *rustling light.*

- 'Flickering light';
- 'Flickering light, a voiced light. The combination of seeing and hearing'.
- 'Uneven light, flickering light, like sunlight through leaves of a tree.'
- 'A thin flickering sun ray.'

2. ***'Similar content' responses***

Two responses were defined as sharing content similarity if the meaning of at least one the predicates comprising them, and\or their overall meaning were judged as 'highly related or similar'. A case in point is the following two responses given to the synaesthesia*: A sweet voice*.

'The sweet sound of music'
-- 'A soothing voice, a sound that is always pleasant to hear'

Note, that though these responses do not share exact wording, their overall meaning is quite similar.

3. ***Non similar responses***, namely, responses that fail to share either verbal or content similarity. Consider, for example, the following three responses to the synaesthesia *silent sharpness.*

- 'Too quiet an atmosphere
- ' razor blade'
- 'something explicit and unambiguous'.

These responses do not share any identical wording, nor do they share similarity of overall meaning.

Scoring

Two independent judges (graduate students from Tel Aviv University) classified the responses into the above three categories. They received some training in the use of the above distinction by analyzing several examples from each category. They were then presented with the entire list of responses generated in response to each synaesthesia, and asked to classify them into one of the three categories. The agreement between subjects reached the level of about 80%. After discussing the cases of disagreement, the judges reached a level of about 90% of agreement. To measure the homogeneity between responses generated for each synaesthesia, we divided the set of responses in each case into groups, according to the similarity between these responses: each group consisted of responses which judged as belonging to either the first or second category (verbally similar, or similar content responses). The idea was that the more the responses of a given synaesthesia make up more groups, so will there be greater heterogeneity between the responses; and the more they comprise few groups, so will there be among them greater homogeneity.

Results:

The results are presented in table 5.

Table 5

	T-test for Dependent Samples Marked differences are significant at p < .05000					
Variable	Mean	Std.Dv.	N	Diff.	Std.Dv. Diff.	t
Non-standard Standard	6.750000 5.900000	1.164158 1.020836	20	.850000	1.460894	2.602048

	T-test for Dependent Samples Marked differences are significant at p < .05000	
Variable	df	p
Non-standard Standard	19	.017509

The main finding is that the mean number of groups among the 'standard synaesthesia' responses is significantly smaller than among the 'non standard' synaesthesia responses; that is, the degree of homogeneity within the former is higher than in the latter. The mean number of groups for the 'standard' structures is 5.9 (118/20), while that of the 'non standard' cases is 6.75 (135/20). This result is in full accordance with our prediction. Comparison of the degree of homogeneity of subjects' responses to 'standard synaesthesias' with responses to 'non standard synaesthesias' points toward a general tendency to higher homogeneity among the former. Furtheremore, a closer inspection of the 'verbally similar' category reveals that this tendency is even stronger than that revealed by the statistical analysis. Thus, among the twenty 'standard synaesthesias' there are seventeen groups in which 'verbal similarity' exists, whereas out of twenty 'non standard synaesthesias' only ten are found. Note, that in the 'content similarity' category the differences are less sharp, even though the same tendency also occurs. Moreover, in the 'standard synaesthesias' there are two groups in the 'literal homogeneity' category containing four responses each, and in the 'similar meaning' category there is one group containing five responses. There are no groups of this size among the 'non standard synaesthesia'. Furthermore, in the 'standard synaesthesias' there are only four instances in the 'literal homogeneity' category in which there is no literal identity whatsoever between responses, in contrast to the eleven instances among the 'non standard

synaesthesias'; also, in the 'similar meaning' category seven instances were counted where there are no similar responses among the 'standard synaesthesias', in contrast to the eleven instances among the 'non standard synaesthesias'.

Discussion

The results of the four analyses presented here support the hypothesis that the 'standard directionality' structures of the synaesthesia are easier to understand and process than the 'non standard' structures. It was found that among the 'non standard' structures there were more synaesthesias that were not interpreted by participants, and there were more inversions, more associative responses and greater heterogeneity between the responses than among the 'standard' structures. All these results indicate that the 'non standard' structures are more difficult to understand than the 'standard' structures.

4. Summary and general discussion

The main thrust of the present article has been to examine directionality in the structure of poetic synaesthesia. First, a systematic structural preference, in poetic discourse, of the 'low to high mapping' over the opposite directionality was described. A cognitive account was then suggested for this selective use (i.e., 'preference' for certain structures over others), according to which the poetic use of synaesthesia conforms to a basic cognitive constraint. This account argues that poetic structures do conform at some levels to cognitive constraints.

Recently, several researchers have taken a similar route in the study of (other) poetic figures. For example, Gibbs and Kearney (1994) developed a cognitive account for the selective preference of 'indirect oxymora' over 'direct oxymora' in poetry (as suggested in Shen 1987). The main argument introduced in Gibbs & Kearney (1994) is that the 'indirect' oxymoron is significantly easier to comprehend than the 'direct' type (based, e.g., on measuring the reaction-times to these two oxymora types). The importance of this finding for the present article is that it suggests that poetry makes a selective use of figures of speech by preferring the 'more basic' (e.g., easier to understand) structure over the less basic one. A similar argument has been made in Shen (1997) with regard to other poetic figures, such as the simile and the zeugma. The importance of this line of research is that it provides an account of regularities characterizing poetic discourse, which traditional, contextual, theories fail to explain. Furthermore, it may account for the observation that, despite the creativity and novelty manifested in poetic language (which results in its characteristic intricacies and complexities, as literary critics would argue), some semantic aspects of poetic language are rather systematic and constrained. It may very well be that this adherence to (cognitive) constraints is what guarantees the interpretability of poetic language, and it is these very constraints, while allowing a certain amount of 'freedom' for poetic language, that ensure its interpretability by limiting the use of other alternatives.

In so far as a more general view of cognition is concerned, the proposal made here may suggest that certain cognitive constraints are general enough to apply both to the 'common' as well as creative uses of language and concepts. As explained in the introduction to this article, the currently received view in the cognitive sciences (e.g., Gibbs 1994; see also Lakoff &

Johnson 1980) maintains that poetic modes of thinking, traditionally attributed to poetry, constrain ordinary human cognition. The view presented here provides a complementary perspective, namely, that in addition to the fact that human cognition is constrained and structured by poetic modes of language, as previously shown, aspects of poetic language are themselves constrained by cognitive principles.

Acknowledgement

* We would like to thank Katie Wales and two anonymous reviewers for their helpful comments and suggestions on an earlier draft of the article.

References

Gibbs, R. (1994) *The Poetics of Mind: Figurative Thought, Language, and Understanding.* Cambridge: Cambridge University Press.

Gibbs, R. and Kearney, L. (1994) 'When parting is such sweet sorrow: the comprehension and appreciation of oxymora', *Journal of Psycholinguistic Research,* 23: 75-89.

Johnson, M. (1987*). The body in the mind: The bodily basis of meaning, imagination, and reason*. Chicago: University of Chicago Press.

Lakoff, G. and Johnson, M. (1980) *Metaphors We Live By*. Chicago: University of Chicago Press.

Lakoff, G. And Turner, M. (1989*) More Than Cool Reason - A Field Guide To Poetic Metaphor*. Chicago: Chicago University Press.

Osgood, C. E. (1980) 'The cognitive dynamics of synaesthesia and metaphor', in Honeck, R.P. and Hoffman, R.R. (eds) *Cognition and Figurative Language*, pp. 203-238. Hillsdale, N.J. “Erlbaum.

MacKay, D.G. (1986) 'Prototypicality among metaphors: on the relative frequency of personification and spatial metaphors in literature written for children versus adults', *Metaphor and Symbolic Activity,* 1(2): 87-108.

Marks L.E. (1982) 'Synaesthetic perception and poetic metaphor' *Journal of Experimental Psychology: Human Perception and Performance* 8(1): 15-23.

Rosch, E. (1975) 'Cognitive reference points', *Cognitive Psychology,* 7: 532-54.

Shen, Y. (1987) 'The structure and processing of the poetic oxymoron', *Poetics Today,* 8: 105-122.

Shen, Y. (1995) 'Constraints on directionality in poetic vs. non-poetic metaphors', *Poetics*, 23: 255-274.

Shen, Y. (1997) 'Cognitive constraints on poetic figures',*Cognitive Linguistics,* 8(1): 33-71.

Shen, Y. (forthcoming) 'Cognition and the use of figurative language in poetry: the case of poetic synaesthesia', in Totosy, S. (ed*) Systemic and Empirical Approaches to Literature and Culture as Theory and Application*. Edmonton: RICL, University of Alberta, Vol. 7 and Siegen: LUMIS, University of Siegen, Vol. 7, 1997.

Tsur, R. (1992) *Toward a Theory of Cognitive Poetics*. North Holland.

Ullman, S. (1957) 'Panchronistic Tendencies in Synaesthesia', in: S. Ullman*. The Principles of Semantics*, pp. 266-289. Oxford: Blackwell.

Williams, J. (1976) 'Synaesthetic Adjectives: a Possible Law of Semantic Change', *Language* 52(2): 461-478.