PSYCHOLOGY AND HUMAN DEVELOPMENT, (ISSN: 2537-950X), 1988, *2*(1), 33–42

http://dx.doi.org/10.2224/phd.6423

BREADTH OF MEANING, INFORMATIVENESS, AND SUPERORDINATION RELATIONSHIPS AMONG SELECTED EMOTION TERMS APPEARING EARLY AND LATER IN DEVELOPMENT

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We conducted 3 studies to investigate some of the characteristics of emotion words. Five sets of 3 emotion words were selected; each set contained 1 basic word appearing early in the developing lexicon and 2 more specific words from the same broad category of emotion appearing later in development. Basic words were hypothesized to be broader in reference, less informative, and superordinate to more specific terms in the same set (examined in Studies 1–3). Undergraduates (*N*s = 36, 60, and 60, respectively) made choices on each of the 10 pairs of predictor words and on 30 comparison pairs. Results supported the hypotheses for the experimental pairs. However, the finding that similar relationships appeared between many pairs of terms for which there were no theoretical expectations casts some doubt on the interpretation.

Keywords: emotion words, language development, breadth of meaning, informativeness, superordination, child development.

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This research was partially supported by Natural Sciences and Engineering Research Council Grant A70320 to Christine Storm and by Social Science and Humanities Research Council of Canada Grant 410-87-0085 to Christine Storm and Thomas Storm. Parts of this paper were presented at the Canadian Psychological Association Meetings in Vancouver, BC (June, 1987).
The content and formatting of this article were edited and updated in 2016, with efforts made to preserve the original meaning.
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Young children use a very small set of words for emotions, which cover the major varieties of emotional experience and circumstances but do not make subtle distinctions in feeling or specify context in detail. In this paper, we focused on some semantic characteristics of these early-appearing, basic terms in relation to later-appearing, more specific terms from the same category of emotion.

In many semantic domains, the hierarchical structure of natural concepts has seemed clear and has been the object of study both in terms of organization and acquisition. Examples of such domains are terms for animals, furniture, and vehicles, all of which have common characteristics: the referents are discrete material objects, either animate or inanimate, natural or constructed. The concepts at each level of the corresponding hierarchies have an internal structure and fuzzy boundaries; in each hierarchy, one level appears to be basic and to be acquired earlier in development (Anglin, 1977; Rosch, 1978; Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). The terms at higher levels refer to a broader range of phenomena and communicate less specific information. The referents of higher-level terms include those for terms subordinate to them in the hierarchy. Thus, an hierarchical organization includes implications about relative breadth of meaning, relative informativeness, and superordinate–subordinate relationships for terms at different levels of the hierarchy.

In semantic domains of other ontological types (e.g., interpersonal traits, emotions), the applicability of hierarchical models is less clear and there is considerable evidence for a dimensional structure (Russell, 1978, 1980, 1983; Watson, Clark, & Tellegen, 1984; Wiggins, 1979). However, the two forms of organization are not mutually exclusive. Hampson, John, and Goldberg (1986) have shown that the above relationships hold for selected triads of interpersonal trait terms, and hierarchical organizations have also been suggested for the domain of emotion concepts (Scherer, 1984; Shaver, Schwartz, Kirson, & O'Connor, 1987; Storm & Storm, in press).

Storm and Storm (in press) presented a tentative hierarchy in the domain of emotion terms, incorporating 525 terms in three postulated levels of generality. The hierarchy was developed on the basis of sorting studies and hierarchical clustering analyses in the first instance, then refined and expanded by a small group of expert judges. Several researchers (e.g., Storm & Storm, 1987) have obtained samples of the productive vocabulary of emotions at a number of ages. In general, the results showed the expected expansion of vocabulary continuing through childhood and adolescence. This expansion takes the form of increasing differentiation within domains of meaning, which are themselves well-established at a very early age (Bretherton & Beeghly, 1982; Harter, 1983; Ridgeway, Waters, & Kuczaj, 1985). These areas of meaning correspond closely to theories of primary emotions (Ekman & Friesen, 1971; Izard, 1971, 1972,

1977; Plutchik, 1980; Tomkins, 1962, 1963, 1982) and may correspond to the basic level concepts of other well-established hierarchies in other domains. Basic level terms are used commonly by young children and constitute a high proportion of all emotion words used. They are also used by adolescents and adults along with a great variety of more specific terms. According to the hierarchical taxonomy proposed by Storm and Storm (in press), these more specific, later-appearing terms are subordinate to terms that name higher-level categories.

We conducted three studies to test the implications of portions of the hierarchy, particularly those related to level of generality and age of acquisition. Hypotheses were that more basic terms, appearing earlier in the development of the emotion vocabulary, would be broader, convey less specific information, and include more specific terms appearing later in the emotion vocabulary, which are subordinate to them in the hierarchy.

Method and Results

Five triads were constructed, consisting of one basic term and two more specific terms from the same category (see Table 1). Basic terms were those most commonly used by young children in studies of the productive vocabulary (Harter, 1983; Storm & Storm 1987); each term represents a major category in our taxonomy and continues to be used by older children and adults. More specific terms were used rarely by children before adolescence but fairly commonly by adults. In each triad, the specific terms may be considered subordinate to the basic term in the sense that the former are varieties of the latter; for example, *joy* and *satisfaction* are kinds of *happiness*. Three studies were conducted using this set of terms.

Table 1. *Basic and Associated Specific Terms Used in the Three Studies*

Basic terms	**Specific terms**
Happiness	Joy
	Satisfaction
Sadness	Disappointment
	Despair
Anger	Jealousy
	Frustration
Fear	Terror
	Anxiety
Surprise	Disbelief
	Amazement

Study 1: Category Breadth

In Study 1, we tested the hypothesis that basic terms would be broader in meaning than the more specific terms that are subordinate to them.

Method

Participants. Participants were 36 introductory psychology students, who took part on a voluntary basis. We tested 1–5 participants at a time.

Materials. We selected 40 pairs of terms. All 10 pairs consisting of a basic term and one of its more specific kinds were included (experimental items), and 30 pairs served as comparison items. The latter were of three types: basic terms paired with specific terms from a different category, basic terms paired with other basic terms, and specific terms paired with other specific terms. These 40 pairs were used in all three studies. Six forms were constructed by combining the two orders for the terms in each pair with three random orders of pairs.

Procedure. Each participant was given one of the six forms, on a randomly determined basis, along with the following instructions:

> We are interested in the meanings of words. Some words have a very broad meaning and some a narrower meaning. A *broad word* can be used to describe a greater variety of situations or behaviors, whereas a *narrow word* is used to describe fewer situations or behaviors. For example, "running" is broader than "sprinting" because sprinting can only be used to refer to a specific behavior, whereas running refers to a wide range of behaviors. In fact, running can be used in all the situations that sprinting can be used in (e.g., one can say a person is running when they are, in fact, sprinting) but sprinting cannot be used in all the situations that running can be used in. That is, if someone is jogging, they are running, but they are not sprinting.

Several other examples were given, along with some trial items. Participants were then given the following instructions:

> Now, we are going to deal with some cases in which the answer may not be as clear. These words refer to feelings or emotions. Below, you will find a list of word pairs. Your task is to decide which of the two words covers a greater variety of feelings or emotions. Please circle the word that you think is broader. Please choose one of the alternatives, even when in doubt.

Results

Participants made forced choices on 40 pairs. Table 2 shows the number of participants who selected the basic term as the broader of the two in each of the experimental pairs.

The normal approximation to the binomial was used to test the probability that each of the obtained numbers for both the experimental and comparison items could have occurred by chance if the true probability was .50 for each word in the pair. Deviations obtained from the expected values were converted into *z* scores; these and probabilities for

the experimental pairs are also presented in Table 2. As can be seen in the table, in 9 out of 10 pairs the basic term was chosen as broader than the more specific subordinate by the majority of participants. For seven pairs, this result was significant.

Table 2. *Breadth: Participants Selecting the Basic Term as Broader in the Experimental Pairs*

Basic term	Specific term	*n*	%	*z*	*p*
Happiness	Joy	27	75	3.00	.001
Happiness	Satisfaction	23	64	1.66	.049
Sadness	Disappointment	20	56	0.67	.255
Sadness	Despair	29	81	3.66	.002
Anger	Jealousy	24	67	2.00	.023
Anger	Frustration	22	61	1.33	.092
Fear	Anxiety	17	47	-0.33	.371
Fear	Terror	32	89	4.66	.001
Surprise	Disbelief	23	64	1.66	.049
Surprise	Amazement	27	75	3.00	.001

In the 30 comparison pairs, no clear prediction follows from the taxonomy. Terms at the same level of the hierarchy are not necessarily equivalent in breadth of meaning. For example, happiness may or may not be broader than sadness, and joy may or may not be broader than disappointment. Basic terms might be expected to be broader than specific terms in a different category, but are necessarily so only when the specific term is in the same category—that is, when it is subordinate to the basic term. Therefore, results are not presented for each of these pairs. However, significant preferences within these pairs were found in 20 cases.

While the hypothesis was supported by the results for the experimental pairs, the large number of significant preferences in the additional pairs raises questions about the interpretation. Proportions of participants choosing the predicted word (experimental pairs) or more frequently chosen word (comparison pairs) were obtained. A one-way (experimental pairs vs. comparison pairs) analysis of variance (ANOVA) was performed on these proportions. There was no evidence that the two groups of items differed significantly in the size of preference.

Study 2: Informativeness

In Study 2, we tested the hypothesis that basic terms would convey less information than the more specific terms that are subordinate to them.

Method

Participants. Participants were 60 psychology undergraduates, who took part in the study on a voluntary basis.

Materials and procedure. These were identical to those in Study 1, except for the instructions. In Study 2, participants were told "Some words tell you more about a thing, event, or behavior than other words. For example, if someone says 'I saw a robin,' as opposed to 'I saw a bird,' we know that that person saw an object that has all of the characteristics of a bird plus some more characteristics that are specific to a particular kind of bird. In other words, more information is being given."

After viewing several examples, participants were given the 40 emotion term pairs and instructed to circle the more informative word in each pair.

Results

Table 3 shows the number of participants selecting the basic term as less informative than its subordinate, along with *z* scores and probabilities obtained. The results for all 10 experimental pairs were in the predicted direction, with the preference being significant in eight cases.

Once again, in comparison pairs, regardless of type, there was no clear prediction. However, a significant preference for one member of the pair was obtained in 20 out of 30 pairs. A one-way ANOVA performed on the proportions for the experimental pairs versus the comparison pairs was significant, $F(1, 38) = 5.38$, $p < .02$. The size of preference for one member of the pair was greater for experimental than for comparison pairs; however, the finding of significant preferences in many comparison pairs does pose problems.

Table 3. *Informativeness: Participants Selecting the Basic Term as Less Informative in the Experimental Pairs*

Basic term	Specific term	*n*	%	*z*	*p*
Happiness	Joy	49	82	4.91	.001
Happiness	Satisfaction	41	68	2.84	.002
Sadness	Disappointment	45	75	3.88	.001
Sadness	Despair	48	80	4.65	.001
Anger	Jealousy	44	73	3.61	.002
Anger	Frustration	40	67	2.58	.005
Fear	Anxiety	34	57	1.03	.151
Fear	Terror	55	92	6.46	.001
Surprise	Disbelief	34	57	1.03	.151
Surprise	Amazement	47	78	4.39	.001

Study 3: Superordinate–Subordinate Relationships

In Study 3, we tested the hypothesis that specific terms in each triad would signify emotions represented by basic terms for the same category.

Method

Participants. Participants were 60 psychology undergraduates, who took part in the study on a voluntary basis.

Materials and procedure. The same 40 pairs of terms were used to construct sentences containing one of three different linguistic hedges: "_____ is a type of _____," "_____ is a form of _____," or "_____ is a kind of _____." Each item was composed of two such sentences, for example, "happiness is a form of joy" and "joy is a form of happiness." Participants were told to select the sentence in each pair that was more meaningful and that made more sense.

Results

Table 4 shows the number of participants who selected as more meaningful the sentence in which the more specific term was said to be a type/kind/form of the basic term. In 9 out of 10 cases, the predicted sentence was chosen as more meaningful by most participants, with four cases being significant.

Table 4. *Superordinate–Subordinate Relationships: Participants Selecting the More Specific Term as a Type of the Basic Term*

Basic term	Specific term	*n*	%	*z*	*p*
Happiness	Joy	39	65	2.33	.010
Happiness	Satisfaction	33	55	0.78	.221
Sadness	Disappointment	45	75	3.88	.001
Sadness	Despair	35	58	1.29	.099
Anger	Jealousy	42	70	3.10	.001
Anger	Frustration	35	58	1.29	.099
Fear	Anxiety	34	57	1.03	.151
Fear	Terror	47	78	4.39	.001
Surprise	Disbelief	30	50	0.00	.500
Surprise	Amazement	34	57	1.03	.151

In Studies 1 and 2, the taxonomy makes no clear predictions for the comparison pairs. In this study, however, a significant preference in the comparison pairs contradicts the taxonomy because there was no relationship of subordination between these terms. There was a significant preference in 11 of the 30 cases. A one-way ANOVA performed on the proportions for experimental versus comparison pairs was nonsignificant.

General Discussion

With respect to the hypotheses, our results were mixed. The most specific and demanding prediction was that in each triad of emotion terms (e.g., happiness, joy, and satisfaction) each of the more specific terms, appearing later in development, would be subordinate to the basic word,

which appeared earlier. Therefore, participants would choose the sentence that described each subordinate term as a form of the superordinate in preference to the sentence that asserted the reverse relationship between the two terms. In 9 out of the 10 cases, the direction of the preference supported this hypothesis, with four cases being highly significant.

Another prediction was that basic emotion terms would be less informative and less specific than later-occurring terms (thus, within a triad, the later-appearing, more specific terms represent a differentiation of the more global concept represented by the basic term). This prediction was supported in all 10 experimental pairs, with eight being significant.

Finally, basic terms were expected to be broader, that is, to apply to a wider variety of behaviors and situations than later-appearing words. This hypothesis is an extension of the informativeness hypothesis, which deals with intentional meaning. In 9 of the 10 experimental pairs, the preference was in the expected direction, with seven being highly significant.

Thus, when only those comparisons are examined for which a significant preference was predicted, there is strong support for each of the hypotheses based on our taxonomy and for the general view of development in this domain. In this conclusion, however, the results for other comparisons of item pairs in which no preferences were predicted are overlooked. In comparing the results for experimental and comparison pairs of items, preferences were more marked in the experimental pairs for the informativeness study, although significant differences were found for several of the comparison pairs. However, there was no evidence for overall differences between the experimental and comparison pairs in the breadth or superordination studies.

In the case of breadth and informativeness, the general hypothesis does not necessarily imply that some later terms might not be clearly broader and have less information than other late-occurring terms. Similarly, early-occurring or basic terms might logically be significantly different with respect to these two aspects. The most troublesome findings appear in the superordination study; these are clearly inconsistent with our formulation that sadness should be considered a form of happiness, that is, as a more specific instance of the general class of emotion referred to by happiness. Yet, the results for this pair appear to indicate this. Similar anomalies occurred in other comparison pairs. Perhaps participants did not interpret the task in the way intended, responding in terms of a more global, less logical approach, which casts doubt on the interpretation of the results for experimental item pairs. These results indicate the importance of including comparison items. Clearly, the method used in these and similar studies (e.g., Hampson et al., 1986) needs to be explored more systematically.

The anomalous results make it difficult to draw firm conclusions about the true semantic relationships among these emotion terms. Additional

hierarchical levels and superordinate–subordinate relationships may be required to describe the organization of these 15 emotion terms, and convey that the apparently anomalous results represent real relationships.

A second possibility is that emotion terms are not organized hierarchically and that participants were forced to respond to items of this kind by other criteria that have yet to be identified. This possibility could be explored by asking participants how they decided on their response in each case. It may be that, in response to experimental items, participants used the predicted logical relationships, but when they were confronted with a forced choice in other comparisons where no logical criterion was available, an alternative systematic, but less logical, criterion was applied.

In summary, we gained some support for our initial hypotheses, but there were also puzzling findings not readily explained within the theoretical framework of these studies. Our findings demonstrate the importance of examining the semantic relationships among terms where they were and were not expected. Further development of both the methods and the theory for examining specific semantic relationships among terms in this domain (and probably others) is needed.

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