

# Lexical naming for Fusion Pictures: an Investigation across Different Age Groups

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## Abstract

Lexical access is defined as the retrieval of the most appropriate word from the lexicon. Lexical access is assessed by employing picture naming. Naming a picture stimulus successfully depends on retrieving the conceptual features correctly. These conceptual features mature with age. The conceptual features can be constrained by employing fusion stimulus. The study aimed assess lexical naming abilities for fusion stimulus in children, younger and older adults. Naming for fusion stimulus was assessed in children between 10-13 years (group 1), and younger adults between 18-25 years (group 2) Fusion stimulus was formed by clubbing the features of two lexical items. and older adults between 55-70 years (group 3). 20 participants were considered in each group. The participants were allowed to give two responses based on the major features and minor features. The major feature was reflected through the first response while the minor feature was assumed to be reflected through the second response. Younger adults outperformed the other two groups. Children had more problems in naming fusion stimulus followed by older adults.

**Key Words:** conceptual features; lexical; constraining; major and minor features

## Introduction

The lexicon of a language encompasses its vocabulary, with words assumed to encompass other words, retrieved contextually. The organization within the lexicon is elucidated through semantic fields, wherein words are grouped based on semantic similarity or contiguity relationships. Similarity involves common features like size and color, while contiguity relies on co-occurrence in a linguistic context, suggesting relatedness.

Lexical access involves retrieving the most fitting word from the lexicon, regulated by the context. Activation initiates a competition among lexical nodes, termed competitor lexical nodes, sharing common conceptual features. Among these competitors, a target lexical node is selected, followed by the activation of phonemic segments related to the target.

Researchers use diverse linguistic tasks to examine lexical-semantic processing, evaluating the organization of lexical items or the lexical access process. The mental lexicon encompasses information on words, concepts, linkages between concepts, and connections between words and pronunciation (Moerk 1981).

Non-linguistic factors influencing naming performance include picture ambiguity and the sensory-motor schema linked to word referents (Gardner, 1973). These factors impact naming latencies. In confrontation naming tasks, stimuli such as pictures, photographs, and real objects are

employed, with pictures being the most common. Picture naming involves sequential steps (Wilson, Bayles & Tomoeda, 1990), including visual recognition, matching to lexicon traces, retrieval of phonemic segments, and verbalization. Naming thus involves encoding, search, and retrieval processes.

Conceptual features play a crucial role in lexical access, activating lemma nodes. Children develop naming abilities as they acquire conceptual features, with label knowledge following. Integration of conceptual features and lexical labels occurs over time, strengthening lexical access with age (Facon, Magis & Belmont, 2011). Conceptual ambiguity, a significant naming variable, relates to the presence of necessary conceptual features for picture identification. Experimental induction of conceptual ambiguity, using fusion stimuli, involves combining features from two lexical items to create a hybrid picture. Naming fusion stimuli requires identifying embedded features (major and minor). While researchers have studied conceptual features in picture naming, exploration of the relationship between conceptual features and picture identification using fusion pictures is lacking in published literature. The study rationale was naming fusion stimuli involves identifying conceptual features, major and minor features, and suppressing unrelated features amid competition from related semantic nodes.

The study aimed to investigate age-related variations in naming fusion stimuli, acknowledging a dearth of literature on this aspect. The claim that naming variation occurs with age is tested due to the sensitivity of cognitive processes enabling the identification of age.

### Aim and Objectives:

To investigate lexical naming abilities for fusion stimuli, focusing on children, younger adults, and older adults.

### Methods

**Participant Details:** The study included three age-based groups, labeled as Groups 1, 2, and 3. Group 1 comprised 20 participants aged 10-13 years, Group 2 included 20 participants aged 18-25 years, and Group 3 consisted of 20 participants aged 55-70 years. Each group maintained an equal distribution of both males and females. All participants were native Kannada speakers.

**Stimulus Description:** In total, 50 stimuli were employed, comprising 18 non-fusion stimuli and 32 fusion stimuli. Non-fusion stimuli consisted of single lexical items, while fusion stimuli involved combining two lexical items to form a single target stimulus. The fusion stimuli were sourced directly from internet repositories and included items from three lexical categories (animals, fruits, and birds). Each lexical item within a category was fused with another from the same category. For instance, a fusion stimulus might feature the facial image of a dog merged with the picture of a crow, where the crow serves as the major stimulus and the dog as the minor stimulus. Non-fusion stimuli, on the other hand, encompassed lexical items from diverse categories.

**Stimulus Selection and Validation:** The stimuli were not drawn from standardized materials; instead, they were chosen for convenience to facilitate the merging of major and minor features, ensuring flexibility in the process. These selected images were then shared with three Speech Language Pathologists (SLPs). A comprehensive table presenting the pictures, major features, and minor features was created and presented to the judges. The SLPs were tasked with confirming the alignment of major and minor features with the corresponding images. They were specifically asked to assess the appropriateness of the specified major and minor features. Feedback from the judges indicated that the majority of the pictures were suitable, with the exception of two instances. In response, modifications were made to the pictures to ensure alignment with the specified features.

**Procedure:** Participants were tasked with naming the picture for non-fusion stimuli, earning 1 point for each correct response, with a maximum score of 18. For each target item, participants provided two responses – the first corresponding to the major feature and the second to the minor feature. The instructions prompted participants to spontaneously name the first word that came to mind for each item. The researchers compared these responses to the major and minor features listed in a reference document. A score of 2 was awarded when both major and minor features were correctly named, 1 for a partially correct response (either major or minor), and 0 for inappropriate responses. The total achievable score for this task was 64.

### Results

Participants from Group 1, Group 2, and Group 3 achieved mean scores of 16, 18, and 18, respectively, for the non-fusion stimulus, with the maximum attainable score being 18. Moving on to Figure 5, the scores for the non-fusion stimulus were 38, 51, and 43 for Group 1, Group 2, and Group 3, respectively, with the maximum achievable score set at 64. These numerical representations provide a snapshot of the performance levels across the three groups, showcasing variations in their responses to both fusion and non-fusion stimuli.

In the evaluation of non-fusion stimuli, Group 2 and Group 3 demonstrated equally impressive performances, reaching the maximum

attainable scores. Even participants in Group 1 performed well, with the only exception being a challenge in naming a few vegetables and fruits, which slightly reduced their maximum scores.

When it came to the fusion stimulus, Group 2 participants excelled, closely followed by Group 3 and then Group 1. Notably, Group 2 participants showcased proficiency in naming both major and minor features, contributing to their high scores. Group 1 participants, while generally accurate, often provided partially correct responses, primarily focusing on the major feature and overlooking the minor one. Notably, the occurrence of no responses was more prevalent in this group. Group 3 participants, on the other hand, tended to interchange major and minor slots, with a higher incidence of no responses. Moreover, Group 3 exhibited longer overtime response durations compared to the other two groups.

In the case of Group 1, diverse responses were observed for the same stimulus. Children in this group tended to concentrate more on the face of the target (fusion item), resulting in an interchange of major and minor slots and subsequently lower scores. Both Group 1 and Group 2 participants predominantly focused on the major feature. An intriguing observation was that participants in Group 2 and Group 3 also took into account the environmental context depicted in the picture, such as land versus water when naming animals. This additional consideration likely contributed to their higher scores. Group 3 participants experienced more confusion than those in Group 2, with a higher incidence of no responses, particularly in Group 1. Maximum confusion occurred in naming fusion stimuli from the animal category, while the least confusion was observed for fruits.

To assess the potential statistically significant differences among the three groups concerning the fusion stimulus, the Kruskal-Wallis test was employed. The obtained  $X^2$  value of 3.44 indicated a significant difference. Subsequently, the Mann Whitney U test was utilized for further analysis. The Z scores obtained from the comparisons between Group 1 and Group 2, Group 2 and Group 3, and Group 1 and Group 3 were 4.55, 3.23, and 4.07, respectively. Corresponding p-values revealed a significant difference in both Group 1 and Group 3 comparisons and Group 1 and Group 2 comparisons.

In summary, the statistical analysis reveals that Group 1 (children) faced challenges in naming fusion stimuli, while Group 3 participants also encountered difficulties, albeit to a lesser extent than Group 1. This suggests that performance exhibited statistically significant variations based on age.

The study delved into the development of conceptual features over age, emphasizing their pivotal role in governing the process of lexical access. In essence, the retrieval of the appropriate word from the lexicon hinges on the accurate identification of conceptual features. The research question regarding the importance of conceptual features for naming was addressed through the strategic use of fusion stimuli in this study. Fusion stimuli, crafted by amalgamating features of two lexical items within the same categories (to prevent confusion), served as a tool to constrain conceptual features.

Children in Group 1 tended to provide more partial responses, focusing primarily on one feature in the picture. The stimulus triggered greater confusion in older participants. This underscores the dynamic nature of conceptual feature development and its impact on naming processes across different age groups.

### Conclusions

The fusion stimulus, a unique amalgamation of two lexical items, introduces an intriguing challenge to the process of lexical access due to its inherent conceptual ambiguity. The primary aim of this study was to delve into the lexical naming abilities associated with the fusion stimulus, exploring how these abilities vary across different age groups. Our

participants comprised 20 children, 20 young adults (Group 1 and Group 2), and 20 older adults (Group 3). Each participant was tasked with naming both fusion and non-fusion stimuli, with scoring based on the identification of major and minor features. Interestingly, the results revealed distinct patterns. Children encountered more difficulties in naming fusion stimuli, while older adults also faced challenges. In contrast, younger adults demonstrated a superior performance, outshining the other two groups in the naming task. These findings shed light on the nuanced dynamics of lexical naming abilities in the context of fusion stimuli, offering valuable insights into age-related variations.

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### Conflict of Interest

There is no conflict of interest.

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