

**Jana Jurčević**

Faculty of Humanities and Social Sciences

University of Rijeka

Croatia

jana.jurcevic@uniri.hr

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## LEXICAL SYNAESTHESIA IN METAPHORICAL COLLOCATIONS: COLLOCATIONAL BONDING OF GUSTATORY ADJECTIVES IN ENGLISH

### 1 INTRODUCTION

When discussing perception and the senses, people often employ figurative language which tends to manifest as metaphorical expressions such as *sweet voices*, *sour scents*, *spicy undertones*, etc.<sup>1</sup> Since metaphorical expressions do not form in a vacuum but depend on the context and co-text, it is no surprise that the simplest form in which they can be observed is a multiword combination. From a morphosyntactic perspective, such combinations do not differ from free word combinations and idioms, e.g.:

- (1) a. *Top with salsa, lime juice, and low-fat **sour cream**.* →  
 b. *There was a **sour smell** leaking from the kitchen at the back of the house.* →  
 c. *She'd prefer it if he wasn't such a **sour puss**, but she loves him regardless.*

Example (1a) represents a free word combination because both words retain their literal meaning. Example (1c) represents an idiom because both components undergo a change in meaning from literal to figurative, and together form a new one (e.g., *sour puss* is a person who constantly complains and looks unhappy). Example (1b) represents a metaphorical collocation because the meaning of the collocate *sour* is not literal, but extends from the domain of taste to the domain of smell. This mapping occurs across different senses – cross-modally – and is known as lexical synaesthesia (LS) in the field of lexical semantics. Some instances of LS are introduced as conceptual metaphors in the literature (Lakoff and Johnson, 1980), while others are considered to rely upon conceptual metonymies (Winter, 2019).

1 The study has been fully supported by the Croatian Science Foundation under the project *Metaphorical Collocations – Syntagmatic Relations Between Semantics and Pragmatics* (IP-2020-02-6319). More about the project on the following link: <https://metakol.uniri.hr/en/>.

In this paper, we argue that the word combination in example (1b) is grounded in specific conceptual mapping, departing from the assumption that LS tends to manifest as a subtype of metaphorical collocations. In particular, the focus has been placed on cross-modal conceptual mappings manifested as binary constructions. For this purpose, corpus-driven research has been conducted as a part of a larger scientific project dealing with metaphorical collocations. The main goal is to shed more light on the process of conceptual mapping and thus contribute to a better understanding of collocational bonding.

## 2 METAPHORICAL COLLOCATIONS

The notion of metaphorical collocations has already, but somewhat tacitly, been put forward by researchers such as Deignan and Potter (2004), Philipp (2011), McCarthy and O'Dell (2017), and Dai, Wu and Xu (2019). Most of these authors did not delve deeply into the subject and did not provide exact definitions of the phenomenon (Patekar, 2022: 37). Nevertheless, detailed definitions can be found in German and Croatian studies on the topic of collocational bonding, in the works of authors such as Reder (2006), Konecny (2010), Stojić (2018, 2019), and Stojić and Košuta (2020). The aforementioned authors define collocations with a metaphorical component as a specific collocational subtype, and call them metaphorical collocations (e.g., a *sweet child* and a *hot woman*), indicating their meaning is figurative. On the other hand, a few examples of non-metaphorical collocations, which lack that figurative component, would be an *innocent child* and a *beautiful woman*.

Departing from the assumption that metaphorical and/or metonymic mechanisms enhance collocational bonding, Stojić and Košuta (2020, 2021, 2022) opted for a usage-based approach dependent on the analysis of four different language corpora (*hrWac*, *enTenTen20*, *deTenTen20*, and *itTenTen20*) to prove the hypothesis. That reasoning subsequently led to the design of a scientific research project supported by the Croatian Science Foundation, called *Metaphorical Collocations – Syntagmatic Relations Between Semantics and Pragmatics* (IP-2020-02-6319), which this study is a part of. The project aims to gain insight into the rules and patterns of collocational bonding. The main hypothesis of the project states that collocational bonding is not arbitrary but motivated by conceptual metaphor and/or metonymy, which enhances semantic cohesion between collocational constituents.

In Section 4, the research goals and hypotheses of this study will be presented as a continuation and elaboration of this larger research project.

### 3 SYNAESTHETIC METAPHORS – PREVIOUS RESEARCH, THE RELEVANCE OF EMBODIMENT AND METONYMIC TRANSFER

As noted by Zhao et al. (2022: 554), “linguistic synaesthesia is a type of language usage whereby lexical items commonly considered to be in one sensory modality are employed to describe perceptions in another”. The best examples of such a phenomenon are metaphorical collocations which contain perceptual metaphors like *sweet voice*, *sour smell*, and *bitter cold*. In these examples, gustatory adjectives are mapped onto different senses, namely hearing, olfaction, and touch. Furthermore, the relevant literature indicates that lexical or linguistic synaesthesia can be found all over the world, in a plethora of different languages (Kumcu, 2021, Stirk Lievers, 2015, Ullman, 1966, Williams, 1976), which points to its status as a true semantic universal.

In their efforts to thoroughly investigate the phenomenon, researchers have fallen into two opposite camps: one group adopted a non-metaphorical and neurobiological explanation of LS (Ramachandran and Hubbard, 2001), whilst the other opted for a metaphorical view (Wilson, 2002, Stirk Lievers, 2017).

In this study, we have chosen the middle ground – a perspective that approaches lexical synaesthesia as a process independent from neurological synaesthesia, but heavily reliant on metonymization due to the embodied nature of language. Metonymies subsequently (in most cases) give way to metaphorization and idiom formation, serving as a necessary prerequisite.

In the mid-1970s, cognitivists recognized that we use our own body-part relations to make sense of objects and spatial relations in our surroundings (Johnson, 2018: 6), and that these body parts are often used imagistically and metaphorically. It was also suggested that perception should not be separated from conceptualization (a notion pioneered by William James in 1911). Furthermore, Embodied Cognition Theory (ECT) provided us with evidence that metaphor is our principal means of abstract conceptualization and reasoning, but it also suggested that the majority of these metaphors are not based on similarities but on common experiential relations occurring between the source and target domains. Grady (1997) named these basic correlational phenomena *primary scenes*,<sup>2</sup> and noted that they form without conscious awareness, from the neural co-activations of the source and target domains.

This aligns with and elaborates on Lakoff and Johnson’s (1980) train of thought, showing us that both metaphor and metonymy (apart from being viewed as rhetorical figures) are cognitive devices that function through conceptual mapping. They defined metonymy by contiguity and pointed out that the mapping during metonymization process occurs inside a single domain. An element of that domain gives mental access to another

<sup>2</sup> Kövecses (2013) refers to these as correlational or primary metaphors, whose terminology we adopt for this study.

element inside the same experiential frame or domain (e.g., *I pledge my allegiance to the Crown*, instead of *I pledge my allegiance to the Queen*). Consequently, unlike metaphor, metonymy is usually more grounded in our experiences, and less abstract, even more basic, and in some cases, it gives rise to metaphor formation. On the other hand, metaphorical mapping involves two different domains: the source and the target domain, and is usually driven by the similarity of concepts (e.g., we can compare time with money via the conceptual metaphor TIME IS MONEY, and subsequently say that *time* can be *spent*, *saved*, *wasted*, that it is *valuable*, and is regarded as *a possession*, etc.).

Radden (2002) suggests that a great deal of metaphors emerge from metonymies and that it usually happens in four cases: correlations derived from experience, conversational implicatures, taxonomic structures and categories, and cultural models. Furthermore, Kövecses (2013) noticed (building upon Grady's insights from 1997) that correlational or primary metaphors emerge from metonymy due to our (early) pre-conceptual experience. He corroborated this with examples of primary metaphors, which actually represent metonymies. A case in point may be illustrated with the example *she's feeling up* and *he's a hothead*, given the fact that happiness and anger incite complementary behavioural reactions, such as upward body posture when we are happy, or a sensation of hotness while feeling angry. This is typical of the process of metonymization in which the effect stands for the cause. Kövecses further suggests that behavioural responses function as metonymies in emotion concepts (as in the above examples), but that they can also be applied more widely.

We confirm this through corpus analysis and demonstrate it in the examples in Section 6, which prove that behavioural responses also function as metonymies in sensory concepts. In the following sections, we shall see how this reflects on collocational bonding.

#### 4 RESEARCH GOALS AND HYPOTHESIS

Since preliminary research within the larger project on metaphorical collocations (described in Section 2) demonstrated that the meaning of the base governs collocational behaviour and triggers semantic extensions in the collocate, it was decided to approach the problem of collocational bonding in this study from the opposite direction. Namely, collocates have been chosen as starting points of the analysis of LS since they are the ones undergoing shifts in meaning and since they, as adjectives, originally pertain to the senses. The decision to focus on gustatory adjectives was based on the previous research (Winter, 2019), as well as the preliminary analysis, which highlighted several crucial points. Firstly, gustatory adjectives can be limited to more or less six subcategories and subsequently six adjectives, which makes gustation a better candidate for comprehensive analysis than the sense of smell, hearing, or vision, which are much more versatile. Secondly, the referred directionality of cross-modal mapping in LS shows a tendency to

map from concrete, more embodied senses (such as taste and touch), to the more abstract ones (like hearing or vision). This reinforced the decision to opt for gustation as a starting point for the analysis and ultimately guaranteed a broader view of the changes in meaning while mapping onto all the other senses. Thirdly, Sketch Engine mostly generated metaphorical collocations including the gustatory adjectives, while other sensory adjectives were not used metaphorically to that extent. Furthermore, since corpus analysis indicated that the most common morphosyntactic form of LS is *adjective + noun*, and the previous literature notes that the primary synaesthetic transfer pattern is the binary attributive junction (Ullman, 1966: 381), we decided to select the most frequent gustatory adjectives as collocates to begin our analysis.

The main purpose of this study is to demonstrate how the human mind employs metaphorical and metonymic conceptualizations of the senses, and how and why these manifest on a lexical level as metaphorical collocations. We suggest that a metaphorical collocation is not arbitrary at all, but dependent on deeply entrenched concepts in our cognition and experience. Furthermore, their binary form tends to align with the necessity for minimal context, which is indispensable in forming figurative meanings. The aim is to observe whether specific patterns of collocational bonding are present in the phenomenon of LS manifested as a metaphorical collocation on a lexical level.

Previous research and preliminary English web corpus analysis gave rise to the following hypotheses: H1 states that metaphorical collocations are the preferred lexical form of LS manifestation. H2 points to the fact that metaphorical collocations enabled by cross-modal mappings stem from metonymy and the cognitive process subsequently applied to it – schematization<sup>3</sup> (i.e., a cognitive process of generalization). When schematization is applied to metonymy, the result is a correlational<sup>4</sup> metaphor. H3 posits that collocational bonding in LS reaches the highest degree of semantic cohesion between collocational constituents when idioms are formed. This is reflected in a low level of substitutability of the collocate.

Methodologically, we have opted for a combination of lexical-semantic, cognitive, and corpus<sup>5</sup> linguistic tools, which were applied in the English web corpus (*enTenTen20*) analy-

3 Schematization is a process of generalizing the characteristics of a specific element inside the frame in order to place it in a different frame or domain. Only when this happens are we able to talk about metaphorical transfers because mapping now occurs between two different domains and is based on similarity, not contiguity (Kövecses, 2013: 80-82).

4 Correlational metaphors (or primary metaphors) are explained by Radden (2002) as metaphors derived from metonymies based on an experienced positive correlation between two concepts or variables. For two variables to be correlated, they need to be conceptually contiguous (i.e., a part of the same frame or domain). A good example of this is the correlation between quantity and verticality (e.g., MORE IS UP/LESS IS DOWN) because both variables come from the same experience.

5 Contemporary computational linguistic approaches that govern corpus analysis provided us with lists of word co-occurrences based on statistics. Information on bonded words was extracted automatically from the corpus with the help of statistical association measures (Evert, 2005). This approach, combined with qualitative lexical-semantic analysis, mitigated the subjectivity of introspective methods and enabled the analysis of genuine examples from real language use.

sis. Considering the attributes of the phenomenon, a frame for lexical-semantic analysis was based on the phraseological approach to collocations, conceptual mappings presented by Lakoff and Johnson (1980, 1999), and the Theory of Embodied Cognition (Johnson, 2018).

## 5 CORPUS AND METHODOLOGY

To test the previously listed hypotheses, this study turned to the English web corpus *enTenTen20* which provided us with access to examples of metaphorical collocations formed through cross-modal mappings, their frequencies, and the contexts in which they are used.

The corpus in question belongs to the *TenTen* corpus family, which consists of more than 40 languages. The version of the corpus used for this study (*enTenTen20*) consists of 36 billion words. The texts it comprises were downloaded from the Internet between 2019 and 2021, and are annotated according to genre and classified based on topic.<sup>6</sup>

The software designed and used for its analysis is called Sketch Engine (Kilgariff et al. 2014) and is equipped with tools that generate three crucial sets of data: n-grams (frequency lists of multi-word units), concordance (examples in context), and text type analysis (statistics of metadata in the corpus).

To explore the mappings of gustatory expressions to other senses, we decided to focus on six main adjectives describing gustation: *sweet*, *sour*, *salty*, *bitter*, *hot*, and *fresh*. In retrieving the most typical collocations with these adjectives, we relied on the Word Sketch function. This function allowed us to observe the different grammatical relations in which these adjectives occur. Since the relation *nouns modified by x* turned out to be the most productive one, we decided to focus on it.

The analysis of collocational profiles was conducted using the concordance option, which provided a lemma with the left and right context of a collocation with a gustatory adjective. Corpus methods have subsequently been supplemented by semantic and lexical analyses focused on types of conceptual mappings, shifts in meaning, and collocational bonding patterns.

## 6 RESULTS AND EXAMPLE ANALYSIS

To present the results, we used tables indicating the frequencies of appearance of metaphorical collocations concerning the sense of gustation. This gave us greater insight into the directionality of cross-modal mappings and the preferred cognitive devices applied.

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6 More details on the *enTenTen20* corpus are available on the official Sketch Engine website, at the following link: <https://www.sketchengine.eu/ententen-english-corpus/> (2 June 2023)

The sense of touch has deliberately been incorporated into the sense of gustation, primarily because of the adjectives *hot* and *fresh*, where taste and touch explicitly overlap.

Each table in this section shows different uses and meanings of a specific gustatory adjective. If an adjective is paired with a noun from the same sensory domain, the meaning stays literal, and cohesion between collocational components is low. However, if it is combined with nouns referring to different senses, the meaning becomes metonymic or metaphorical, and collocational cohesion rises.

## 6.1 Adjective sweet

Table 1: Collocation frequencies and mapping tendencies of the adjective *sweet*

Type of mapping	intra-modal	cross-modal			
Type of meaning	Literal	metonymic & metaphorical			
Sensory modality	gustation + touch	olfaction	hearing	vision	idioms
Nouns sorted by frequency of appearance (number of hits) in the corpus	treat (19,988)	smell (10,019)	voice (8,271)	smile (6,242)	spot (47,151)
	flavour <sup>7</sup> (14,519)	scent (7,854)	sound (6,343)	face (4,808)	tooth (19,648)
	taste (14,479)	aroma (4,688)	note (5,902)	ass (2,322)	dream (11,690)
		fragrance (4,101)	music (5,562)	disposition (1,617)	deal (6,095)
		perfume (1,856)	song (5,132)		revenge (3,171)

Table 1 shows different uses of the adjective *sweet*, both literal and figurative. In the cases where the meaning remains literal, the mapping that occurs is termed *intra-modal*. Contrary to intra-modal mapping, there is the cross-modal category which represents cases of conceptual mapping *across* different modalities/senses. For instance, in the collocation *sweet scent*, the concept of sweet now refers to olfaction, not gustation. The meaning in this case becomes metonymized due to the contiguity of the two senses. Furthermore, cross-modal mapping can result in metaphorical meaning as in the example *sweet music*, because in addition to metonymy, schematization/generalization is employed. Idioms can also form as a result of cross-modal mapping. Some of them will rely on metonymy (e.g., *a sweet tooth* which is a result of metalepsis, a subtype of metonymy where logically

<sup>7</sup> Frequency values for *flavour* represent the sum of frequencies for *flavour* and *flavor*. These nouns are listed separately in Sketch Engine due to spelling differences (British vs. American English orthography), but because they represent the same word it was decided their frequency of appearance would be shown as the total sum of frequency values listed for each of them.

preceding concept gets replaced by the one that derives from it), some only on metaphor (e.g., *a sweet revenge*), where we have a case of correlational metaphor formed by schematizing the meaning of *sweet* into something enjoyable or pleasurable). Others, however, will implement both mechanisms or the same mechanism multiple times (e.g., *a sweet spot* where the collocate changes its meaning from concrete to abstract utilizing metonymic transfer from taste to touch and subsequent schematization, while the change in the meaning of the base provides an example of yet another metaphor<sup>8</sup>).

Frequencies of specific nouns collocating with the adjective *sweet* reveal the mapping tendencies in LS. Namely, idiomatic expressions are most frequently used, while literal usage takes second place. The third place is occupied by the nouns belonging to the domain of olfaction and is determined by metonymic mapping. The fourth place is assigned to nouns belonging to the domain of hearing, while the fifth place belongs to the realm of vision. Mappings to the domains of vision and hearing are predominantly metaphorical transfers. This corroborates the assumption that LS tends to map from more embodied (less abstract) senses to those that are less embodied and more abstract.

## 6.2 Adjective *sour*

Table 2: Collocation frequencies and mapping tendencies of the adjective *sour*

Type of mapping	intra-modal	cross-modal			
Type of meaning	literal	metonymic & metaphorical			
Sensory modality	gustation + touch	olfaction	hearing	vision	idioms
Nouns sorted by frequency of appearance (number of hits) in the corpus	taste (7,269)	smell (881)		look (1,208)	note (4,665)
	flavour (1,831)	odour <sup>9</sup> (307)		face (1,036)	puss (287)
	aftertaste (247)	aroma (143)		mood (918)	
	tang (189)	scent (111)		expression (670)	
		stench (102)		attitude (285)	

<sup>8</sup> *A sweet spot* can refer to two things – a physical point or area on a bat, club, or racket at which it makes the most effective contact with the ball, or an optimum point or combination of factors or qualities.

<sup>9</sup> Frequency values for *odour* represent the sum of frequencies for *odour* and *odor*.

The analysis of the adjective *sour* shows a somewhat different situation than the one presented by analyzing collocations with the adjective *sweet*. Namely, idioms were not that frequently used, but they still took second place, while literal usage proved to be the most common. Nouns related to vision took third place, while those referring to olfaction came fourth. Cross-modal mappings from gustation to olfaction were primarily metonymic, grounded in the genuine contiguity of the senses. Similarly, some mappings from gustation to vision also proved to be metonymic, but the requirement for contiguity was satisfied by a shared experiential framework (e.g., tasting something *sour* prompts a grimace – an outward bodily reaction to that specific sensation). In contrast, other mappings from taste to sight were metaphorical (e.g., a “sour mood/attitude”), or more accurately, metaphonymic, where metonymy served as an experiential foundation for generalization, enabling the formation of metaphorical expressions. The domain of hearing was not mapped onto according to the corpus data, apart from the case of the idiom *a sour note*, which is based on metaphorical transfer. We presume this was the case because hearing is a very abstract and predominantly mentally experienced sense, unlike taste, smell, or touch which are more physically experienced. It is quite similar to vision, but unlike vision, it was not mapped onto because of culture-specific experiences of the extralinguistic reality that reflect themselves in such linguistic idiosyncrasies. Moreover, as we shall see further along, some sensory adjectives (e.g., *sweet*) seem to be more productive in figurative meaning construction than others (e.g., *salty*). It is presumed that this is a consequence of their more frequent usage in general, which makes their meaning more prone to schematization – a necessary prerequisite for further metaphorization.

By comparing the adjectives *sweet* and *sour* in the context of LS, it is possible to conclude that despite the differences the preferred mapping direction still has a starting point in more embodied (Johnson 2018), physical, or concrete senses, where it relies on metonymy, after which it progresses to more abstract, metaphorical constructions.

### 6.3 Adjective salty

Table 3: Collocation frequencies and mapping tendencies of the adjective *salty*

Type of mapping	intra-modal	cross-modal			
Type of meaning	literal	metonymic & metaphorical			
Sensory modality	gustation + touch	olfaction	hearing	vision	idioms
Nouns sorted by frequency of appearance (number of hits) in the corpus	taste (2,779)	smell (340)			seadog (64)
	flavour (1,725)	scent (181)			
	tang (560)				
	aftertaste (168)				

In the case of the adjective *salty*, we can see that forming metaphorical collocations is not as common as it was with the previously analyzed adjectives. Still, there is a cross-modal mapping from gustation to olfaction and one idiomatic expression (e.g., *a salty seadog*) corroborated by the corpus.<sup>10</sup> Mappings from gustation to olfaction were metonymic, while the idiom combines both metonymy and metaphor (for example, the metonymic transfer is evident in the noun *seadog*, originally referring to a shark and later to an experienced sailor). *Sea* in *seadog* evokes associations of saltiness and implies a common frame. However, the suffix *-dog* as well as the adjective *salty*, suggest metaphorical mapping through schematization, semantically extending the meaning from a sailor to a seasoned mariner, characterized by experience and a touch of ruggedness. The favourable directionality of mapping still seems to go from more embodied senses (e.g., touch, gustation, and olfaction) to abstract ones (e.g., hearing, and vision). This analysis shows that hearing and vision have been left out as target domains, which can again be explained by the high level of abstraction or non-physical nature of these two senses.

<sup>10</sup> It is possible to think of more idioms that include the adjective *salty* (e.g., salty remark, salty tongue, salty price), but they were not found in the corpus.

## 6.4 Adjective bitter

Table 4: Collocation frequencies and mapping tendencies of the adjective *bitter*

Type of mapping	intra-modal	cross-modal			
Type of meaning	literal	metonymic & metaphorical			
Sensory modality	gustation + touch	olfaction	Hearing	vision	idioms
Nouns sorted by frequency of appearance (number of hits) in the corpus	taste (15,107)		laugh (1,025)	smile (998)	end (10,497)
	cold (7,186)		cry (567)		enemy (6,298)
	flavour (3,349)				pill (5,677)
	feeling (2,221)				dispute (4,530)
	chill (410)				disappointment (3,581)

Table 4 shows the mapping tendencies of the adjective *bitter*. Literal usage takes first place, while second place is taken by idioms, and mapping onto the domain of olfaction has been completely omitted<sup>11</sup> here. Hearing and vision were mapped onto with similar frequency, with hearing<sup>12</sup> being somewhat more represented. All of the idiomatic expressions (apart from *a bitter pill*<sup>13</sup>) resorted exclusively to metaphorical mapping by generalizing the meaning of *bitter* to something bad or unpleasant. The same situation is present in the mappings to the domain of hearing. On the other hand, mapping from gustation to vision seems to be both metonymic and metaphorical (e.g., when one tastes something bitter it is common to make a specific grimace which represents an unpleasant reaction and feelings regarding that taste). This is what makes a primary scene and enables a correlational metaphor to form.

11 It is presumed that this is the case because *bitter smells* are usually described as *fishy*, *amine*, or *ammoniacal*.

12 Some of the examples of mapping onto the domain of vision, such as *bitter sight* and *bitter eye*, were not found in the corpus.

13 The idiom *a bitter pill* relies on both metaphor and metonymy. Initially, metonymy is evident as “bitterness” and “pill” share a common experiential frame. Later, through the generalization of this experience as unpleasant, metaphorical transfer occurs.

## 6.5 Adjective *hot*<sup>14</sup>

Table 5: Collocation frequencies and mapping tendencies of the adjective *hot*

Type of mapping	intra-modal	cross-modal			
Type of meaning	literal	metonymic & metaphorical			
Sensory modality	gustation + touch	olfaction	hearing	vision	idioms
Nouns sorted by frequency of appearance (number of hits) in the corpus	sauce (25,026)			girl (10,937)	topic (61,447)
	food (14,813)			guy (7,987)	pursuit (11,120)
	pepper (12,411)				trend (8,491)
	dish (4,609)				shot (7,027)
					mess (4,842)

The mapping tendencies in the case of the adjective *hot* are as follows: nouns forming idioms with the adjective took first place. All of these mappings rely on metaphor. The second place is reserved for the literal use of *hot*, while the third and final place involves a cross-modal mapping to the domain of vision using metonymy (e.g., when I see a handsome man, I feel my body temperature rising. I start to feel hot at the sight of him, so he gets labeled as the hot one by switching cause for effect). Olfaction and hearing have been left out as target domains.

<sup>14</sup> The adjective *hot* was chosen instead of *spicy* because it proved to be more prolific in forming metaphorical collocations and taking part in LS. Furthermore, it has an (obvious) antonym in the domain of gustation: the adjective *fresh*, which will be analyzed in the following section. Both adjectives have proved to be just as reliant on the sense of taste as they are on the sense of touch.

## 6.6 Adjective fresh

Table 6: Collocation frequencies and mapping tendencies of the adjective *fresh*

Type of mapping	intra-modal	cross-modal			
Type of meaning	literal	metonymic & metaphorical			
Sensory modality	gustation + touch	olfaction	Hearing	vision	idioms
Nouns sorted by frequency of appearance (number of hits) in the corpus	flavour (6,800)	breath (2,728)	voice (3,389)	look (26,273)	start (31,084)
	taste (3,480)	smell (2,516)		perspective (23,363)	idea (20,851)
		aroma (2,435)		insight (8,355)	approach (15,092)
		fragrance (2,091)		eye (8,258)	blood (9,401)
					take (6,815)

The final table shows the mapping trends of the adjective *fresh*. Just like the adjective *hot*, it relies on both taste and touch, but is somewhat more prolific in cross-modal mapping, and covers all the senses. Idiomatic expressions containing *fresh* take first place by their frequency of appearance in the corpus, while the domain of vision comes in second. Hearing took third place and, along with vision and idioms, primarily relied on metaphor. Mapping onto the domain of olfaction was metonymic, but appears last based on its frequency in the corpus. We presume the reason for this could be the schematization<sup>15</sup> of *fresh* as a concept, which subsequently gets to appropriate the meaning *new*, and is used as such.

## 7 DISCUSSION

### 7.1 The three hypotheses

Regarding the three hypotheses, we can conclude that all of them have been confirmed:

H1 – Metaphorical collocations are the preferred lexical form of LS manifestation.

This presupposition was corroborated by the analysis of the corpus data, which pointed to the fact that the minimal form in which LS manifests itself is a collocation

<sup>15</sup> Schematization (as explained in Section 4) is the generalization of the main characteristics of a particular concept.

based on metonymic and/or metaphorical mapping. Furthermore, the frequencies of occurrence of these multi-word expressions, and especially their contextualized examples (viewed through the concordance option in Sketch Engine) showed that metaphorical collocation is truly the canonical and most productive form in which LS can be observed.

H2 – Metaphorical collocations enabled by cross-modal mappings stem from metonymy and one other cognitive process subsequently applied to it, schematization. This leads to the formation of primary or correlational metaphors, which are (just like metonymy) conditioned by our bodily experiences. These findings point to two highly important observations: that meaning lies on a spectrum and that body and mind form an indivisible whole and are in constant interaction, which manifests itself in human cognition and language.

### 7.1.1 Meaning on a spectrum

It has been shown that meaning begins in the domain of the literal and then transitions to metonymic. This metonymic meaning gives way to metaphor construction through schematization (i.e., generalization). Finally, metaphors as well as some metonymies have the potential to participate in idiom formation. This can be seen in the examples listed in Figure 1: *sweet candy* kept its literal meaning, while *sweet fragrance* became metonymic because the mapping occurred in the same frame/domain of interdependent senses (i.e., our experience teaches us that things that taste sweet very often have a smell associated with and dependent on sweetness). When the meaning of the adjective *sweet* got schematized (or generalized) into something pleasurable and good, it became more abstract and more widely applicable to other domains of human experience apart from the sense of taste (or smell). This is when the process of metaphorical mapping became possible and is exemplified in the metaphorical collocation *sweet girl*. Finally, idioms form mostly when metaphorical mapping is employed (like in the example *sweet deal*), but some cases combine metonymy and metaphor (e.g., previously explained *bitter pill*) as well as ones where it is difficult to tell what process we are dealing with since it is rather difficult to determine the exact number of frames in question. What is also relevant for idiom formation is of course the frequency of their usage, which ultimately makes them what they are – pragmatically fixed expressions with high semantic cohesion between their constituents and a low degree of substitutability.

literal meaning → metonymized meaning → metaphorized meaning → idiomatic meaning
<i>sweet candy</i> → <i>sweet fragrance</i> → <i>sweet girl</i> → <i>sweet deal</i>
embodied → embodied but transposed → abstract and schematized → abstract and pragmatically fixed

Figure 1: Meaning on a spectrum and the degree of embodied cognition

### 7.1.2 Dialectics of the body and the mind

Apart from the fact that metonymy turned out to play a significant role in the processes of metaphorization as well as idiom formation, as a cognitive mechanism it seems to be deeply embedded in bodily experience. This was corroborated by the example analysis and is especially conspicuous in the cross-modal metonymic mappings from the sense of taste and touch to the sense of smell. These senses are considered to be more concrete and embodied modalities (unlike vision and hearing), and we usually experience them in a shared frame. For instance, it is very common to express that something has a *sour smell* (which is usually a result of its acidic nature and can typically be felt through the sense of taste), but it gets extended to other senses because of experiential contiguity. These mappings caused by contiguity place metonymy at the base of motivated collocational bonding in the semantic field of human senses.

Moreover, corpus data have shown that human senses are not discrete categories – they overlap and interact with emotional and behavioural human responses, which is ultimately reflected in language constructions. The overlap of the senses can be seen in the meaning of some of the nouns functioning as collocational bases, such as *tang*, which can equally refer to the sense of taste and smell, sometimes even hearing. Furthermore, this overlap has been considered while deciding to combine gustation and touch to properly analyze the adjectives *hot* and *fresh*. Finally, the interaction of human sensory input with emotional responses and (language) behaviour is probably best represented in idiomatic expressions such as *sweet revenge*, *bitter end*, and *hot topic*, which conflate senses and emotions.

H3 – Collocational bonding in LS reaches the highest degree of semantic cohesion between collocational constituents when idioms are formed. This is reflected in a low level of substitutability of the collocate. For instance, it is not possible to change the collocate *fresh* to *cool* in the idiom *fresh start* because that would change the meaning of an entire expression although the mentioned adjectives can be considered near-synonyms. On the other hand, even if we replace the targeted collocate with a more appropriate word considering its intended meaning in the collocation (e.g., *new start*), the idiomatic aspect will be lost. Moreover, collocates such as gustatory adjectives possess a very limited collocational range (i.e., the set of words they can be combined with), but compensate for it through cross-modal mappings. These mappings in turn, both metonymic and metaphorical, strengthen collocational bonds and ensure semantic cohesion between chosen constituents.

### 7.1.3 Contributions to the problems of collocational composition

Besides confirming the specific hypotheses concerning this study, there are some general findings on the patterns of collocational bonding that need to be pointed out:

- a) In the cases of LS, the role of the collocate's meaning in forming a metaphorical collocation turned out to be of pivotal importance. The example analysis of gustatory adjectives in metaphorical collocations has shown that cross-modal mappings were enabled by semantic extension of the collocate alone.
- b) No morphosyntactic differences between metaphorical and non-metaphorical collocations on the human sensory domain were found. These correspondences have been ascribed to colligation (Firth, 1968: 181): the preferred syntactic patterns of the English language.
- c) The distribution of metaphorical collocations in the semantic field of human senses shows that LS is mostly unidirectional, presenting a tendency to map from more concrete and embodied senses (e.g., touch and taste), to more abstract ones (e.g., vision and hearing).
- d) Metaphorical collocations (referring to the semantic field of human senses) represent dynamic and developmental aspects of the human lexical system. These collocations are neither arbitrary nor the product of the mental lexicon's structure.

All this gives fresh insight into the laws of selective combining, which are confirmed to be semantically predetermined and pragmatically governed.

## 8 CONCLUSION

We can conclude by summarizing the main results of this study in the following points:

- a) Metaphorical collocations represent a preferred lexical form of the semantic universal<sup>16</sup> known as lexical synaesthesia.
- b) Metaphorical collocations characterized by cross-modal mappings stem from conceptual metonymy and correlational, or primary metaphors.
- c) Collocational bonding in LS reaches the highest degree of semantic cohesion between collocational constituents when idioms are formed. This is reflected in a low level of substitutability of the collocate.
- d) Metaphorical collocations represent a useful category in investigations of semantic change, human cognition, conceptualization, and perception. As a collocational subtype, they can be employed in various fields of study, ranging from lexicography (e.g., analyzing polysemy) to construction grammar and simulation theory (e.g., conceptualizing the senses), extending in phraseology (e.g., tracing the origin of idiomatic expressions) or diachronic semantics and pragmatics (e.g., looking into semantically bleached or entrenched metaphors).

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16 As pointed out on p. 3.

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## POVZETEK

**LEKSIKALNA SINESTEZIJA V METAFORIČNIH KOLOKACIJAH:  
KOLOKACIJSKO ZDRUŽEVANJE PRIDEVNIKOV ZA OPISOVANJE OKUSA V  
ANGLEŠČINI**

Namen raziskave je osvetliti vlogo leksikalne sinestezije (LS), pojava, za katerega je značilno opisovanje enega čuta z značilnostmi drugega (npr. okušanje zvoka – *sladka melodija*), v procesu oblikovanja metaforičnih kolokacij. LS kaže na zanimiv preplet čutnega zaznavanja in jezikovnega izražanja, katerega raziskovanje se je izkazalo za pomembno iz več razlogov. Opozarja namreč na kompleksnost človekovega pojmovanja in na pomen utelešanja jezika, ki na različne načine vplivata na oblikovanje kolokacijskih vezi. Zanimanje za LS se je povečalo, ko je analiza primerov pokazala, da LS in metaforične kolokacije sprožata in omogočata ista kognitivna procesa – metonimija in metafora. Da bi omenjene pojave podrobneje proučili, smo izvedli korpusno raziskavo, v okviru katere smo zbrali primere metaforičnih kolokacij, ki se nanašajo na človeške čute. S pomočjo obsežne analize podatkov iz korpusa (*enTenTen20*) smo želeli odkriti vzorce in težnje pri jezikovnem povezovanju različnih čutov. Pomenska analiza podatkov je pokazala usmerjenost medmodalnih preslikav in omogočila identifikacijo pomensko motiviranih kolokacijskih zvez s področja človekovega čutnega zaznavanja. Rezultati analize kažejo, da so metaforične kolokacije prednostna oblika LS. Kolokacijske vezi, ki jih omogočajo medmodalne preslikave, izhajajo iz konceptualne metonimije in primarnih metafor. Kolokacijsko povezovanje s pomočjo LS dosega najvišjo stopnjo pomenske kohezije med kolokacijskimi sestavinami pri oblikovanju idiomov, kar se odraža v nizki stopnji zamenljivosti sopojavnic. Na podlagi korpusne in leksikalno-pomenske analize ugotavljamo, da metaforične kolokacije tvorijo smiselno kategorijo za raziskovanje pomenskih sprememb, človeške kognicije, pojmovanja in zaznavanja.

**Ključne besede:** metaforične kolokacije, metonimija, leksikalna sinestezija, medmodalne preslikave, utelešenje

## ABSTRACT

**LEXICAL SYNAESTHESIA IN METAPHORICAL COLLOCATIONS:  
COLLOCATIONAL BONDING OF GUSTATORY ADJECTIVES IN ENGLISH**

This study seeks to shed more light on the role of lexical synaesthesia (LS), a phenomenon exemplified by expressing one sense in terms of another (e.g., gustation for sound – *a sweet melody*), in the process of forming metaphorical collocations. Lexical synaesthesia is a fascinating intersection of sensory perception and linguistic expression, the investigation of which has proved to be significant for several reasons. Namely, it points to the complex workings of human conceptualization,

the relevance of the embodied nature of language, and subsequently shows ways in which it affects the formation of collocational bonds. This notion came to the foreground when example analysis indicated that LS and metaphorical collocations are both motivated and enabled by the same cognitive processes: metonymy and metaphor. To investigate these phenomena closely, we conducted corpus-driven research to extrapolate examples of metaphorical collocations pertaining to the human senses. By analyzing a wide range of corpus data (*enTenTen20*), we aimed to uncover patterns and tendencies in how different senses are interrelated linguistically. The semantic analysis provided insight into the directionality of cross-modal mappings and information on semantically motivated collocational bonding in the field of human sensory experience. Our findings indicate that metaphorical collocations represent a preferred form of LS, with collocational bonds enabled by cross-modal mappings stemming from conceptual metonymy and primary metaphors. Moreover, collocational bonding in LS reaches the highest degree of semantic cohesion between collocational constituents when idioms are formed, as reflected in the low level of substitutability of the collocate. Based on corpus and lexical-semantic analysis, it has been concluded that metaphorical collocations present a useful category in investigations of semantic change, human cognition, conceptualization, and perception.

**Keywords:** metaphorical collocations, metonymy, lexical synaesthesia, cross-modal mappings, embodiment