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Olfactory vocabulary and collocation in French

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Abstract: This article is concerned with words pertaining to olfaction in first and second language French. Focusing on adjective collocates for *odeur* and *parfum* in word association tasks and in short written productions, the results show certain preferences for each of these words. A number of similarities and differences between natives and non-natives are noted. The question of typical nativelike language use is raised.

Key words: collocation, corpus, French, smell, vocabulary, word association task.

1. Introduction

It is generally recognised that olfaction is not served well by language in comparison to the other senses. And accounting for smells using linguistic means is interesting since it essentially involves description based on appreciation of information received from an external source (which may also be perceived visually, touched, etc.). This article presents the results of an online survey focusing on the words *odeur* and *parfum* in French. In particular, it is concerned with mind's eye collocation through listed items in a word association task and with actual collocation found in answers to specific questions pertaining to the two stimulus words. While the findings from word association tasks cannot be considered in the same way as actual usage, it is nonetheless possible to look at the breakdown of answers in both instances and to compare features. This article looks at findings across the complete dataset before going on to look at first (L1) and second language (L2) differences. Despite a relatively low percentage of non-native replies, and despite obvious caveats in relation to the 'quick-and-dirty' method employed for data collection, differences between L1 and L2 answers are discussed.

2. Putting words to smells

In the opening pages of Patrick Süskind's novel *Das Parfum*, a wary wet nurse complains of the devilish Jean-Baptiste Grenouille

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who, she claims, does not have the usual 'good' smell of an infant. When asked to explain what constitutes a 'good' smell ("*was heißt 'gut'?*"), the nurse is stuck for words; she can recognise smells, remember them, work with them, but finds it difficult to name them:

> The wet nurse hesitated. She knew very well how babies smell, she knew precisely – after all she had fed, tended, cradled, and kissed dozens of them… She could find them at night with her nose. Why, right at that moment she bore that baby smell clearly in her nose. But never until now had she described it in words. (Süskind [2000] 2001: 13)

Indeed, the very idea of putting words to smells is intriguing since it typically involves describing rather than naming: as Kleiber and Vuillaume (2011a) point out, smells do not have names in the same way that colours do. And the relative paucity of specific olfactory vocabulary is generally acknowledged in comparison, say, to what is observed for the visual senses (cf. David *et al.* 1997; Le Guérer 2002; Plümacher & Holz 2007; Kleiber & Vuillaume 2011a; however, the universal nature of this claim may be called into question – Wnuk & Majid 2014). Parallels can be made with audition (cf. Dubois 2000), which, like olfaction, relies on the transformation-interpretation of a stimulus: in the one case (audition) physical or vibratory, in the other case (olfaction) molecular, *i.e.* bio-chemical (Salesse & Gervais 2012). But there is the added question of culture when it comes to dealing with smells (Boisson 1997), and models of appreciation are essentially acquired socially: talking about or describing certain olfactory sensations may be considered difficult, 'to-be-avoided' or taboo even (cf. Barkat-Defradas & Motte-Florac 2016) and there are further issues such as personal preference and types of habitual reception or individual differences of opinion.

Looking beyond the particular issue of the linguistic apportionment of olfaction, this article focuses on collocative adjectives associated with the central words *odeur* and *parfum*. Adjectives are seen as a useful source of enquiry given that the expression of olfactory experience implies description rather than naming (Candau & Wathelet 2011, Vassiliou & Lammert 2011). And it would seem that the hedonic component inherent in describing smells, not least because of the positive-negative emotions involved in memory of olfactory experience (Shrode 2012), is particularly conducive to the use of adjectives (David *et al.* 1997, Vassiliou & Lammert 2016). In the case of *odeur* and *parfum*, so-called "core" meanings (*i.e.* most typical, as given in the 2009 Lonsdale and Le Bras frequency dictionary for French) follow this binary categorisation: negative appreciation (*i.e.* unpleasant smell) in the case of *odeur* ("*il sentait mauvais, l'odeur des vieillards*" – Lonsdale & Le Bras 2009) and positive appreciation

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(*i.e.* pleasant smell) in the case of *parfum* ("*divers sont les parfums des fleurs*" – Lonsdale & Le Bras 2009). This opposition forms the basic starting point for the present study on adjective collocates. The semantic properties of *odeur* and *parfum* in terms of concreteness or abstractness (cf. Kleiber & Vuillaume 2011b) and the different axes of classification (cf. David *et al.* 1997) are not discussed here in any detail, although these could be the focus of future analysis of L1-L2 differences using a larger, more balanced dataset.

3. Method of enquiry

3.1. The survey

The data used in this study come from an online survey carried out in November 2015. While the original survey covered a range of questions pertaining to olfactory experience[2], this article looks at a selection of those, namely word association questions (1 and 2), inviting people to list the first words that come to mind in association with *odeur* and *parfum*, and further questions (3 on preferred smells; 4 on disagreeable smells) focusing on the subsequent uses of these terms in longer answers. The main reason for using this pair of stimulus words (apart from their obvious centrality in dealing with olfaction) was positive-negative connotation based on "core meaning" (Lonsdale & Lebras 2009). The precise wording of the questions (which were obligatory for all participants) was the following:

> **Question 1.** On vous dit *odeur*, vous dites...? Donnez la liste des premiers mots qui vous viennent à l'esprit.
>
> **Question 2.** On vous dit *parfum*, vous dites...? Donnez la liste des premiers mots qui vous viennent à l'esprit.
>
> **Question 3.** Quels sont vos parfums ou odeurs préférés ? Pourquoi ? Merci de prendre le temps de répondre de façon détaillée, avec des phrases plutôt que des mots isolés.
>
> **Question 4.** Quels sont les parfums ou les odeurs que vous n'aimez pas ? Pourquoi ? Merci de prendre le temps de répondre de façon détaillée, avec des phrases plutôt que des mots isolés.

An Internet survey, for all its problems and shortcomings, has the basic advantage of reaching a large number of people over a short

[2] Cf. the questionnaire used by David *et al.* (1997). The survey used in this study (see Appendix) was initially carried out as part of an interdisciplinary project on olfaction at the University of Perpignan resulting in a workshop in March 2016. Special mention is due to the following students who presented some of the data: Caroline Travé, Christy Mounié, Jean-Pierre Badie, Julie Van Damme and Maï Leray. Thanks are due to Alex Boulton for his comments on an early draft of this article and to two anonymous reviewers.

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period of time. Given that the method used to share the survey with potential respondents was via online media (essentially email, Twitter and Facebook), there was no control over who participated (general information concerning respondents is provided in the Appendix). The basic assumption was that, although each participant would be responding in unique conditions, the same questions were put in the same way and each participant was answering when it suited them best (*i.e.* it is they who decided to click on the link and give five to ten minutes of their time) with no pressure, no stopwatch.

Although it is never possible to control fully the participants in a given activity, it is of course possible to accompany or influence them through preparation or priming. In this study, no attempt was made to overtly prepare or prime. Rather, it was hypothesised that a simple, spontaneous priming effect would occur via the task topic and the various questions pertaining ostensibly to *odeur* and *parfum*. In other words, by asking participants to list the first words that come to mind in relation to *odeur* or *parfum* (questions 1 and 2), the aim was to discover just what items were frequently returned, looking at how they relate to the stimulus words.

Within the confines of this article, looking at answers to questions 1 and 2 (but also subsequently at answers to questions 3 and 4), we concentrate on those responses that can be considered to be collocational, *i.e.* that are associated with the stimulus words through potential immediate linguistic co-occurrence, either to the left (-1) or the right (+1), *i.e.* in adjectival positions[3]. In French this means mostly +1 position candidates since adjectives typically follow the noun. However, given the survey design (for questions 1 and 2, informants were asked to list isolated forms rather than giving long answers), no particular attention is paid to adjective position (contrary to the study by Vassiliou & Lammert 2011).

The extent to which the term 'collocation' should apply to a particular degree of fixedness, recurrence or semantic distinctiveness will not be debated here. This article works on the simple assumption that collocative possibility (whether items are given with morphological agreement or as lemmas) is sufficient to warrant their inclusion, *i.e.* the favouring of syntagmatic association. Given the masculine-feminine opposition with the two stimulus words *odeur* (F) and *parfum* (M), items are generally displayed here as lemmas[4] (although in extracts from the long answers, fully contextual samples are given). Wherever possible, answers have been left unedited, including original

[3] Also included are adjectives preceded by degree modifiers such as in *plutôt agréable*.
[4] The decision to display lemmatised adjectives (in particular for questions 1 and 2 where no context is supplied) is specific to this study and may not be a tenable in other cases, with other stimulus words (*e.g.* for the word *magie*, where *blanche* and *noire* are systematically given in the feminine, as opposed to substantival adjectives such as *merveilleux* given in the masculine form).

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expressions and idiosyncratic language usage (whether nativelike or not). However, some spelling errors (whether genuine or slips of the keyboard, including additional spaces, recurring letters, etc.) and punctuation issues were altered to enable automatic searches.

3.2. Word association task

Research on word associations has shown that meaning-based associations tend to dominate (Fitzpatrick 2006, Mollin 2009). For example, in English, if you say *cat* and I offer *dog*[5] as the first word that comes to mind, then I reveal a meaning-based association rather than a string-based or syntagmatic association such as *black*[6]. However, it could also be argued that the *cat-dog* association is also one of co-occurrence since within a wider context *cat* and *dog* do co-occur in English, in particular, say, in texts pertaining to domestic animals. And as Taylor (2012) points out (though referring to usage, not to word association tasks), we typically encounter cats and dogs more often in daily life than many other animals: "in the world outside of language, certain events may tend to be associated with another kind of event. Since a clap of thunder generally occurs with a flash of lightning, it comes as no surprise that the words thunder and lightning should also tend to occur in close proximity." (Taylor 2012: 146). Moreover, different stimulus words may not all be treated in the same way depending on typical usage, personal experience, theme, etc. (not to mention the effects of priming).

Given the nature of the word association task in this study, it is potential for collocation that is considered foremost, *i.e.* the items respondents are willing to associate with a stimulus word. Thus if an item spontaneously offered by a respondent *can* combine satisfactorily with the stimulus words then it is considered, the basic idea being that respondents do not generally give random answers, but rather base their choices on typical associations or an expected set of patterns they have in their minds (Hoey 2005).

3.3. Hypotheses

It was hypothesised that adjectival answers to the first two questions would be largely present and that these would ultimately reflect the types of connotations found for these words in French, the basic idea being that *parfum* would generate positive, 'flowery'

[5] According to David Coulson (ResearchGate, 20 July 2016) *dog* is by far the most common response to the stimulus *cat* in the Edinburgh Associative Thesaurus compiled in the 1970s, based on word association task results. And Mollin (2009: 187) points out that *cat* is the highest response type for the stimulus *dog*.

[6] In the Corpus of Contemporary American (CoCA – http://corpus.byu.edu/coca/) *black* is the most frequent immediate left (-1) collocate for *cat*.

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meanings and *odeur* more negative, 'stinky' ones, according to the examples illustrating core meaning in the Lonsdale and Le Bras (2009) frequency dictionary for French (see above). It was further hypothesised that answers given by the L2 group would differ from those of native speakers since the overall access and exposure to the language, and subsequent forming of networks of associations are not the same, both qualitatively and quantitatively. It was hypothesised that the same overall pattern would be found for questions 3 and 4 (in terms of the types of 'positive' or 'negative' associations), again with differences according to L1-L2 status, in particular with a less rich palette of associations emerging for non-natives, in keeping with regular findings on the development of L2 vocabulary (on vocabulary breadth, see Milton 2006, 2008; on lexical richness and high-level learners, see Forsberg Lundell *et al.* 2014).

4. Results

The online questionnaire yielded 298 usable answers from a range of people of different backgrounds (see Appendix). Respondents were grouped into two broad categories[7], native French (L1 group, n=235) and non-native (L2 group, n=63). Although the L2 group includes all non-native respondents (regardless of L1, country of residence, etc. – see Appendix), it is mainly constituted of high proficiency L2 users according to the self-assessment ratings based on the Common European Framework of Reference for languages.

The following paragraphs will concentrate on answers to questions 1 and 2 (section 4.1), and 3 and 4 (section 4.2). Answers to non-obligatory questions 5 and 7 (see Appendix) will also be referred to.

4.1. Answers to questions 1 and 2

The answers yielded a total of 842 entries for question 1 and 789 entries for question 2 (see Table 1). Most entries were single words or compound forms; others included multi-word responses (e.g. *bouche qui pue*, *champ avec purin*, *herbe fraîchement coupée*), onomatopoeia (e.g. *hmm*, *sniff sniff*) and comments or statements (e.g. *pas forcément agréable*, *je quitte les lieux*, *relève de l'alchimie plus que du naturel*). In all cases, each entry, whether single or multi-word, was considered as a token. There was no limit to the number of answers each respondent could give.

[7] It should be pointed out that the questionnaire was not designed specifically to target L1-L2 differences. The decision to investigate (albeit tentatively) L1-L2 differences arose from the fact that nearly a quarter of respondents turned out to be L2 users of French. However, given the imbalance in the dataset (see results section 4 below) a degree of caution is required when dealing with the findings.

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Question 1 (odeur)	*Question 2 (parfum)*
L1 Fr (n=235): 680 tokens, 223 types; 2.9 mean tokens per person, SD=1.97	L1 Fr (n=235): 635 tokens, 281 types; 2.7 mean tokens per person, SD=1.71
L2 Fr (n=63): 162 tokens, 93 types; 2.6 mean tokens per person, SD=1.59	L2 Fr (n=63): 154 tokens, 117 types; 2.4 mean tokens per person, SD=1.68

Table 1: Answers to questions 1 and 2

Of the different token entries, the number of types (*i.e.* the number of different items) was the following: 276 types in all for question 1, and 354 in all for question 2. Looking at each group individually (Table 1), we find 223 types for 680 tokens (L1) and 93 types for 162 tokens (L2) in response to question 1 (pertaining to *odeur*), and 281 types for 635 tokens (L1) and 117 types for 154 tokens (L2) in response to question 2 (pertaining to *parfum*).

Concerning potential -1 or +1 adjectives in response to question 1, these accounted for 13.5% of all types in the L1 group and 22.6% in the L2 group. And in response to question 2, these accounted for 20.3% (L1) and 20.5% (L2) respectively. These findings are more or less in line with those of other studies (*e.g.* Fitzpatrick 2006, Mollin 2009), which, although mainly focusing on English (looking at collocation more generally rather than concentrating on adjectival forms), show a similar pattern, with meaning-based responses making up the majority of the answers. Moreover, L2 respondents produced a similar percentage of collocational answers to L1 respondents, surpassing them, even, in the case of question 1 (*odeur*).

The top three most frequently listed adjectives for question 1 (see Table 2) and the top two for question 2 (see Table 3) are the same for both groups of speakers: *mauvais*, *bon*, *agréable* (Q.1); *agréable*, *bon* (Q.2). These adjectives actually occur frequently in French: using log likelihood values, the I-FR corpus[8] gives *bon* and *mauvais* in the top three -1 adjectives for French, while *mauvais* is in the top ten +1 adjectives; in the Lonsdale and Le Bras dictionary, which lists the 5000 most frequent words in French, *bon* is ranked 94, *mauvais* 274, and *agréable* 2841. These adjectives also have a high degree of dispersion, *i.e.* they are found in a variety of different text types: on a scale ranging from 27 to 100, the score is high for *bon* (81) and *mauvais* (88), and reasonably high for *agréable* (72), indicating an even spread of use across the entire corpus (rather than being confined to a particular register or set of data). Moreover, these adjectives convey clear appreciative meanings.

[8] There is no outstanding reference corpus for French comparable to the BNC or CoCA for English. The present article makes use of the 260 million word Leeds Internet corpus for French, I-FR (http://corpus.leeds.ac.uk/internet.html). No attempt is made here to compare I-FR findings to other potential reference corpora for French.

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Odeur L1	*Odeur* L2
mauvais (38), bon (23), agréable (10), corporel (7), nauséabond (6), désagréable (5), fort (4), charnel (2), étrange (2), ancien (1), caractéristique (1), chaud (1), enivrant (1), fleuri (1), frais (1), fumé (1), gênant (1), important (1), incommodant (1), moins agréable (1), odoriférant (1), pas forcément agréable (1), perceptible (1), personnel (1), plutôt agréable (1), puant (1), puissant (1), pénétrant (1), sale (1), sucré (1)	mauvais (8), bon (6), agréable (5), désagréable (4), frais (2), âgé (1), attirant (1), beau (1), dégueulasse (1), délicieux (1), floral (1), fresh (1), fruité (1), intense (1), parfumé (1), particulier (1), plaisant (1), puant (1), puissant (1), sentimental (1), subtil (1)
118 tokens, 30 types	41 tokens, 21 types

Table 2: Adjectives corresponding to *odeur* (question 1)

Parfum L1	*Parfum* L2
agréable (35), bon (14), cher (12), capiteux (7), sucré (7), chimique (5), fort (5), léger (5), boisé (3), enivrant (3), entêtant (3), fleuri (3), fruité (3), sensuel (3), subtil (3), artificiel (2), chic (2), doux (2), délicat (2), envoûtant (2), féminin (2), jaune (2), musqué (2), personnel (2), plaisant (2), sophistiqué (2), addictif (1), attirant (1), beau (1), bouleversant (1), corporel (1), élégant (1), floral (1), frais (1), impersonnel (1), indispensable (1), intense (1), joli (1), lourd (1), mauvais (1), naturel (1), obsédant (1), parfumé (1), piquant (1), profond (1), propre (1), préféré (1), raffiné (1), rare (1), romantique (1), rouge (1), suave (1), super cher (1), travaillé (1), vert (1), vieux (1), vénéneux(1)	agréable (3), bon (3), séduisant (2), aromatique (1), charmant (1), concentré (1), entêtant (1), esthétique (1), fort (1), fragrant (1), frais (1), fruité (1), féminin (1), grand (1), intense (1), liquide (1), lourd (1), musqué (1), poivré (1), respirable (1), secret (1), sublime (1), sucré (1), trop fort (1)
164 tokens, 57 types	29 tokens, 24 types

Table 3: Adjectives corresponding to *parfum* (question 2)

Looking more closely at the different adjectives listed (see Tables 2 and 3) and the types of experiences of olfaction they seem to imply, for L1 speakers there are marginally more negatively connotated associations with *odeur* conveying disagreeable meanings (*mauvais*, *nauséabond*, etc.). However, there is also a largish proportion of positively connotated associations for *odeur* (*bon*, *agréable*[9], etc.).

[9] One is reminded of the Christmas carol *Quelle est cette odeur agréable ?* for which *odeur agréable* has been translated into English as *fragrance* (but also *goodly fragrance* or *perfume*: https://www.hymnsandcarolsofchristmas.com/). The use of *odeur* for reminiscing on agreeable smells is discussed further on in this article.

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This contrasts with what we find for *parfum* in the L1 data, where there is a greater number of positive associations which convey agreeable meanings (*agréable*, *bon*, etc.). For the L2 group, we see a similar situation for *parfum*, with a majority of positively connotated associations. However, the results for *odeur* are different: there is a majority of positive types for *odeur* (*attirant*, *beau*, *plaisant*, etc. as well as the ubiquitous *agréable*). Further data would be required to follow up this finding, to see just to what extent non-natives are bound (or not) by what is typically used in nativelike French. The results for questions 3 and 4 will offer some means of furthering this query.

Concerning both *odeur* and *parfum*, qualitative differences are manifest in the types of rare (infrequent) adjectives listed: for example, in the L1 data we find adjectives such as *nauséabond*[10] for *odeur*, and *capiteux* and *enivrant* for *parfum*. While none of these words can be termed frequent, being absent from the Lonsdale and Le Bras (2009) dictionary (and beyond K-12 using Tom Cobb's Vocabprofile[11]), they do collocate strongly with *odeur* and *parfum* respectively, as shown by the high Mutual Information scores (MI > 11, Ellis *et al.* 2008: 380) observed in the I-FR corpus: *odeur nauséabonde* (12.35), *parfum capiteux* (12.19), *parfum enivrant* (11.47).

Given that the subset of L2 data is considerably smaller than that of the L1 data, the observations presented here should be considered foremost as points for future study. Nonetheless, the fact that the most frequently used adjectives are the same for both groups and that certain high MI scoring adjectives only occur in the (admittedly more abundant) L1 data is worthy of note. Of interest, too, is the use of positively connotated associations for *odeur* by L2 respondents.

4.2. Answers to questions 3 and 4

Looking now at the 'long' answers to questions 3 and 4, the mean number of words produced differs from one group to another, with L1 respondents being considerably more verbose (Table 4). However, with a standard deviation exceeding the mean for both questions, there is a large degree of intragroup variation. This is less the case for the L2 group. For both groups of speakers, answers on agreeable smells (question 3) are longer on average (Table 4).

[10] Although *nauséabond* does not appear in the L2 data for questions 1 and 2, there is one occurrence for the L2 group in answer to question 4 (see Table 7).

[11] http://www.lextutor.ca/vp/. So-called 'K' levels refer to frequency bands: thus K-1 stands for the first level or 1000 most frequent words, K-2 for the second level or second most frequent slice of 1000 words (1001 to 2000), and so on. Lextutor's word lists are based on the Lonsdale and Le Bras corpus, and include K-bands beyond the 5000-word cap used for the frequency dictionary. The words in question here are: *enivrant* (K-13), *nauséabond* (K-17), *capiteux* (K-21).

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Question 3 *(agreeable smells)*	*Question 4* *(disagreeable smells)*
L1 Fr (n=235): total words 7859; 33.4 mean number of words produced per person, SD=43.8 347 occurrences of *odeur* (230 singular, 117 plural); 158 occurrences of *parfum* (79 singular, 79 plural)	L1 Fr (n=235): total words 5863; 24.9 mean number of words produced per person, SD=42.6 306 occurrences of *odeur* (182 singular, 124 plural); 94 occurrences of *parfum* (20 singular, 74 plural)
L2 Fr (n=63): total words 1255; 19.9 mean number of words produced per person, SD=18.9 41 occurrences of *odeur* (30 singular, 11 plural); 39 occurrences of *parfum* (19 singular, 20 plural)	L2 Fr (n=63): total words 821; 13 mean number of words produced per person, SD=10.8 50 occurrences of *odeur* (33 singular, 17 plural); 25 occurrences of *parfum* (5 singular, 20 plural)

Table 4: Answers to questions 3 and 4

Given the relative paucity of the data (in particular for the L2 group) it is with a certain degree of caution that we interpret findings for the use of different adjective types and tokens in association with *odeur* and *parfum* in answers to questions 3 and 4 (see Tables 5 to 8). Still, it is worth noting that there are several forms which are among the most frequently used in both groups: *préféré* for question 3 (unsurprisingly perhaps since it is used in the original question: "*Quels sont vos parfums ou odeurs préférés ?*"); *fort* and *corporel* for question 4 (although with so few occurrences in the L2 data this would warrant further investigation).

We expected speakers to give different responses in association tasks compared to actual production (in keeping with existing research – Mollin 2009). And so we note that the most frequent -1 and +1 adjectives found in answers to questions 3 and 4 are not the same as those found for questions 1 and 2: whereas *bon* and *mauvais* were frequent in the quick response part of the questionnaire (questions 1 and 2), these are less present (if at all in some cases) in the long answers. Instead, we find frequent use of like and dislike oriented verbs, and we also see a range of adjectives more suited to subjective (*i.e.* motivated by personal experience) description (with lower MI scores than for the those mentioned above in relation to questions 1 and 2). For example, in answers to question 4, *odeur corporelle* and *odeur forte* (see Table 7) could also be classified under the more general idea of 'bad smell'. In fact, we see the adjective *mauvais* elsewhere (*e.g.* with *hygiene* or *haleine* – examples 1 and 2)[12] or in association with the word *souvenir* to evoke bad memories (examples 3 and 4). Interestingly, clear-cut

[12] Wherever possible, examples are given as they were supplied, complete with typos and errors. In most cases, examples are selected extracts and do not correspond to complete answers. The L1-L2 status of each author is given in brackets.

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positive or negative oriented associations are not overwhelming (see Tables 5 to 8), with a number of 'neutral' or factual meanings (*naturel*, *synthétique*, *humain*, *typique*, etc.), mostly in the (more abundant) L1 data.

1. Le caca, les pieds, le fromage pourri. C'est signe de mauvaise hygiène ou de chose à ne pas manger. (L1)
2. Les aisselles dans le métro, l'haleine mauvaise. (L2)
3. Je n'aime pas l'odeur du céleri car je n'aime pas en manger et ça me rappelle de mauvais souvenirs. (L1)
4. Je déteste l'odeur des tripes (c'est un mauvais souvenir d'enfance). (L1)

There is a marked presence of 'flowery', 'fruity', mellifluous adjectives in both L1 and L2 answers to question 3, in particular in association with *parfum*: *fleuri*, *floral*, *fruité*, *doux*, *sucré*. These are also present to a certain degree in answers to question 4, to describe smells that are (too) sickly sweet, as in the following examples (5 to 7):

5. Le vomi, c'est dégoûtant et les parfums trop sucrés. (L1)
6. Je n'aime pas les parfums forts sur les personnes, trop sucrés ou trop fleuris qui m'agressent. (L1)
7. Les parfums trop sucrés, j'ai l'impression de ne plus pouvoir respirer. (L2)

Odeur L1	*Odeur* L2
préféré (11), doux (3), frais (3), fleuri (2), léger (2), naturel (2), addictif (1), agréable (1), alimentaire (1), bon (L) (1), boisé (1), connu (1), corporel (1), discret (1), dynamique (1), floral (1), fort (1), froid (1), fruité (1), mauvais (L) (1), particulier (1), premier (L) (1), rafraîchissant (1), simple (1), typique (1)	préféré (1), doux (1), fort (1), naturel (1), résistible (1)
42 tokens, 25 types	6 tokens, 5 types

Table 5: Adjectives corresponding to *odeur* (question 3)

Parfum L1	*Parfum* L2
préféré (15), fruité (7), sucré (5), fleuri (3), frais (3), léger (3), naturel (3), floral (2), corporel (1), délicat (1), doux (L) (1), fort (1), iodé (1), musqué (1), puissant (1), suave (1), vanillé (1)	préféré (6), floral (2), doux (1), fleuri (1), fort (1), léger (1), naturel (1), sexy (1), sucré (1)
50 tokens, 17 types	15 tokens, 9 types

Table 6: Adjectives corresponding to *parfum* (question 3)

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Odeur L1	*Odeur* L2
fort (8), corporel (7), mauvais (L) (6), chimique (4), âcre (3), désagréable (3), fort (L) (2), nauséabond (2), sucré (2), acide (1), agréable (1), agressif (1), animal (1), âpre (1), artificiel (1), collant (1), écœurant (1), fécal (1), humain (1), léger (1), lourd (1), naturel (1), profond (1), puissant (1), répugnant (1), scato (1), toxique (1), typique (1), urbain (1)	corporel (1), écœurant (1), fort (1), lourd (1), nauséabond (1), repoussant (1), sucré
57 tokens, 29 types	7 tokens, 7 types

Table 7: Adjectives corresponding to *odeur* (question 4)

Parfum L1	*Parfum* L2
fort (7), synthétique (2), âcre (1), ancien (1), artificiel (1), capiteux (1), chimique (1), fleuri (1), léger (1), mélangé (1), puissant (1), sucré	fort (2), doux (1), floral (1), vivifiant (1), poivré
19 tokens, 12 types	6 tokens, 5 types

Table 8: Adjectives corresponding to *parfum* (question 4)

Looking in detail at the likes and dislikes expressed in answers to questions 3 and 4, there is a clear tendency in the data for likes to indulge in nostalgia, often referring to childhood memories (examples 8 to 13) with marked author ownership through the use of pronouns (cf. David *et al.* 1997): *mon jardin*, *ça me appelled chez moi*, *mon enfance*, *mes odeurs préférées*, etc.

8. Beaucoup d'odeurs sont liées au souvenir de mon jardin d'enfance: la lavande, puissante ; l'iris, délicat ; le seringat, capiteux. (L1)
9. L'odeur de la mer, de l'iode ça me rappelle chez moi. (L1)
10. L'odeur du croissant chaud par pure nostalgie, car nos croissants étaient faits maison avec une machine à pain et cuits au four. (L1)
11. L'odeur du pin, ça me rappelle mon enfance. Et l'odeur de la montagne en hiver (l'air froid, les sapin, etc.). (L1)
12. Celles qui ont un lien avec une émotion, un souvenir du passé. (L1)
13. Mes odeurs préférées : odeur d'herbe, de feuilles d'automne, de foret de sapins, de croissants frais (odeur de Paris), odeur du papier de Livre de poche, odeurs associées a des moments spéciaux de ma vie (vacances à la campagne, lectures de mon adolescence, déplacements en France). (L2)

While it was hypothesised that the word *parfum* would generally

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give positively oriented associations for questions 1 and 2 (as indeed was generally found – see above), the long answers to questions 3 and 4 allow us to nuance this rather basic idea: that *parfum* coincides with more positive meanings is one thing, but that in actually describing likes this implies that *parfum* should top the list as the most frequent item (question 3), and that *odeur* should top the list for dislikes (question 4), is quite wide of the mark. If we take the L1 group, although the number of uses of *parfum* is marginally higher in answers to question 3 (158 for 7859 words in question 3 as opposed to 94 for 5863 in question 4), and the number of uses of *odeur* is marginally higher in answers to question 4 (306 occurrences for 5863 words in question 4 as opposed to 347 for 7859 in question 3), the overall preference for *odeur* in both sets of answers is striking (see Table 4). For the L2 group, however, for whom the dataset is considerably smaller, we can observe a roughly equivalent number of uses of *parfum* and *odeur* for describing likes (question 3 – see Table 4), and double the number of occurrences of *odeur* for describing dislikes (question 4).

So, as can be seen in examples 8 to 13, it is in fact the word *odeur* that is mostly used to describe agreeable smells (with the frequently occurring bigram *odeur de*, which is also used for disagreeable smells – see examples 3 and 4 – in which *odeur* can be said to be dependant, *i.e.* on the source of the smell that is referred to) and the memories of these. This is perhaps most striking in descriptions of gastronomical smells (*odeur de la cuisine*), and smells of nature (*odeur de la nature*) and of people (*odeur d'une personne*, *odeur des bébés*) (examples 14 to 20):

14. L'odeur de la cuisine est ma préférée, elle fait saliver et met en appétit. (L1)
15. L'odeur d'un bon plat est toujours un plaisir car c'est le signe d'un futur festin, que ce soit un gâteau ou un bon curry. (L1)
16. La citronnelle pour son odeur de citron naturelle et agréable. (L1)
17. J'aime l'odeur des oignons à la poêle, et celle des roses anciennes. (L2)
18. J'aime lorsqu'on arrive à assimiler une odeur à la personnalité d'une personne. Pour les odeurs, j'aime les odeurs de la nature (pluie, forêt, bois, herbe...) ou des bonnes odeurs de cuisine, pâtisserie, boulangerie. (L1)
19. L'odeur des petits bébés, parce que j'adore les enfants. (L2)
20. Je n'aime pas trop les parfums, je préfère des odeurs naturelles comme la forêt, la pelouse, la pluie, le bois, les livres nouveaux etc. J'adore sentir la nature. (L2)

The word *parfum* is often taken as meaning bottled scent, which, when mentioned, is generally either loved (examples 21 and 22) or loathed (examples 23 to 25):

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21. Lancôme et Pacorabane car ce sont des parfums qui me ressemblent frais, fruités et légers. (L2)
22. Je suis fan de parfums. J'en ai presque une dizaine. Mon créateur favori est Serge Lutens. De manière générale, il faut que ça soit plutôt original, assez unique, quelque chose qui reste, qui marque. (L1)
23. Je ne supporte pas l'odeur des magasins de parfums type Séphora. Je me sens attaqué par plein de parfums qui se combinent mal et je sens vraiment le côté artificiel des parfums. (L1)
24. Je n'aime pas les parfums de Dior. J'ai envie de vomir et avec les parfums de couleur verte, j'ai la migraine. Bref, tous les parfums qui sentent fort me rendent malade et j'ai la tête qui tourne. (L1)
25. Je n'aime pas les parfums Dior, Poison et Paris. (L2)

Elsewhere, *parfum* occurs often in the string (*mon/mes*) *parfum*(*s*) *préféré*(*s*)[13] (which is more frequent than the equivalent string with *odeur*– see however example 13), as in examples 26 and 27:

26. Mes parfums préférés sont ceux qui sentent le frais, le naturel, les fleurs et fruits. (L1)
27. Je suis extrêmement fidèle a mes parfums préférés. (L2)

There is a difference between questions 3 and 4 in terms of the use of singular-plural. As Taylor (2012) observes in reference to English (using the British National Corpus), there is a general tendency for nouns to occur more frequently in the singular than in the plural (at a ratio of approximately 3:1). Therefore, it is claimed that "a noun is biased towards the singular or plural form if the singular-plural ratio diverges markedly from the 3:1 ratio" (Taylor 2012: 154-155). Although a similar reference corpus is lacking for French, a quick manual check on a sample of nouns extracted from the I-FR corpus shows a marked general preference for singular forms. This, of course, does not exclude certain nouns in certain uses being 'skewed' either to the singular or the plural which is exactly what makes sampling of authentic language use so important, in order to know what is skewed, to what extent, and with what co-occurring elements. In the data pertaining to questions 3 and 4, the relative frequency of plural forms (see Table 4) appeared to be higher when talking about dislikes (despite the recurring string *mes parfums préférés* for question 3). And whereas likes often refer to a specific smell, scent or memory, dislikes often (though by no means always) relate to general types that are

[13] Given the nature of the survey, several abbreviated versions are found, such as "*Parfums prefers: fleurs car odeurs agréables rappelant les vacances*" or "*Parfum préféré: Invictus*". While the meaning of *parfum* in this string could, in other contexts, be interpreted as meaning *flavour* (as in "*mes parfums preferés sont: chocolat, fraise et pistache*"), there are no occurrences of this meaning in the data.

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deemed disagreeable (see examples 28 to 31). This difference is found in both groups of speakers.

28. Je n'aime pas les odeurs d'excréments, trop fortes, qui piquent le nez. (L1)
29. Les mauvaises odeurs, en particulier celle que j'ai parfois l'impression de porter sur moi, ça me met mal à l'aise (odeur de renfermé, de linge mal séché, fumée froide, transpiration). (L1)
30. Les odeurs des voitures, les parfums trop forts des vieilles femmes. (L2)
31. Les parfums trop forts ou portés trop abondamment, qui saturent l'espace autour de la personne qui les porte. (L1)

In answers to questions 3 and 4 (as for questions 1 and 2), neither *odeur* nor *parfum* yielded any figurative strings such as *odeur de jeunesse* or set expressions such as *être en odeur de sainteté*. It can be noted, however, that optional questions 5 and 7 yielded a range of expressions in which the main uses of *odeur* and *parfum* were non-literal, in particular in answers to question 5 where *l'argent n'a pas d'odeur* and *mettre/être au parfum de* were the most frequently cited expressions. In answers to question 7, alongside creative answers found in both groups (e.g. *odorable*, *parfumeurant*, *France: la mère des parfums*), there were also more 'predictable' positive-negative expressions as well as reminiscing and flowery ones. And while the word *odeur* did appear to be more easily associated with likes and love in L2 answers to question 7 (cf. results for question 3 above), this tentative observation would require further (and fuller) investigation before any patterns could be confirmed. Adjective collocates are strikingly absent from answers to questions 5 and 7, for both groups of speakers.

5. Summary and discussion

It was hypothesised that items associated with *odeur* and *parfum* would ultimately reflect the positive-negative connotations of these words in French according to core meanings. The results are partly supportive of this: that we find the expected positive-negative connotations is true to an extent, although it bypasses some interesting findings, such as the positive connotations of *odeur* found in both groups for recounting certain agreeable experiences (epitomised by the concept of *odeur-doudou* given by one respondent in answer to question 7, meaning "*toutes les odeurs qui me rappellent des moments de mon enfance, qui sont agréables et réconfortantes*") and the presence of adjectives providing factual or descriptive rather than positive-negative associations. Thus while the core meanings are played out to a certain extent, the idea of coreness must not be mistaken for what it is not, *i.e.* a reason for expecting *parfum* to form only positively

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connotated associations and *odeur* only negatively connotated ones. And there are instances in answers to question 5 and 7, for example, where *parfum* is far from conveying the nice floweriness envisaged at the outset, with expressions such as *un parfum de vice* or *un parfum de corruption* or even *un parfum de Vatican* ("*pour dire que des faits très graves sont habilement et vigoureusement masqués, étouffés*"). These relatively low-occurring examples, which follow the same basic pattern, conferring on *parfum* a negative or harmful effect, are found among both groups of speakers in this study. However, core meaning can also be used to great effect, as is demonstrated in the following passage taken from the *Canard enchaîné* newspaper (in reference to the French presidential candidate François Fillon, following allegations of fake jobs) where the potential for positive meaning to emerge through the use of *parfum* (preceded by the verb *aimer*) is manifest as an otherwise bad smell becomes agreeable or preferable from the point of view of the smeller (appreciating the effects of the smell on others):

> Certains se pincent le nez : 'une boule puante'. Oui, mais ils en aiment tant le parfum, quand elle tombe de l'autre côté… (*Canard enchaîné*, 5023, 1 February 2017: 1)

Concerning L1-L2 differences, two possible outcomes might have been expected: either that L2 users would display similar results to L1 users, only with reduced range and diversity; or that L2 users would display different results from L1 users, in particular since the types of collocational and frequency constraints that work for L1 users are less present. In fact, it appears that both outcomes are attested (at least in part). While it has been shown that the L2 data give results that are not wildly different from those of L1 uses in many respects (for example, the overall percentage of adjective answers given in questions 1 and 2, or the presence of the same most frequent forms), L2 respondents were on average less productive than L1 respondents; also, it would appear that certain constraints that come into play for L1 users are not as present in the answers given by L2 users, thus giving rise to some original answers (*i.e.* the L2 answers did not merely constitute a subset of the L1 answers, and included other items and associations – see Table 2). However, caution is required here since L2 speaker numbers are low in comparison to the L1 group in this study. Also, it should be pointed out that, as is often the case when dealing with groups of people, *post hoc* classification based on extra-linguistic information is essentially a methodological artefact. More detailed speaker distinctions and better balanced groups would certainly be a desirable feature of any future study.

Studies in corpus linguistics have shown how language tends to make use of recurring sequences or multi-word units (Sinclair

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1991). Words are not so much considered in this respect as individual building blocks, more or less available for selection upon demand, but rather as items bound up within preferred or frequently encountered sequences. The perceived sense of 'togetherness' and the frequency with which the associations typically occur (as well as other criteria such as recency and thematicity – Jones & Estes 2012) are considered all important for using language in a nativelike manner. With regard to the words *odeur* and *parfum*, certain hedonic adjectives such as *bon* and *mauvais* were cited frequently in the word association tasks in both speaker groups; these are typically high-frequency, high-dispersion, low MI scoring, *passe-partout* forms. With regard to low-frequency, high MI scoring associations, on the other hand, Nick Ellis and others have claimed that it is this type of knowledge that makes even advanced learners different from natives. Although referring to learners of English, for these authors, non-native speakers with more than 10 years of instruction "still have a long way to go in their sampling of language […] They are starting to recognise and become attuned to more frequent word sequences, but they need help to recognise the distinctive formulas" (Ellis *et al.* 2008: 391). L1 speakers' ability to pick up on the high MI scoring associations is interesting since the collocates in question, although infrequent, basically stand out because they never occur with other words. Moreover, the literary overtones implicit in certain distinctive associations (see for example *odeur âcre*[14] and *parfums capiteux* in the following extract from Michel Honaker's novel *L'adieu au domaine*) suggest latent knowledge of a particular type of French which, though present in reference corpora, is probably absent from the typical input on which most learners build their L2:

> Quel éblouissement que ce Théâtre Maryinsky ! Cette lumière diamantine qui cascade des lustres, fond dans les velours rouges et polit les colonnes de marbre, cette rumeur sourde qui s'élève, ponctuée du tintement des sabres d'apparat. Dans les couloirs se mêlent fracas élégants, uniformes chamarrés de décorations et toilettes diaphanes. L'odeur âcre des cigares se mêle aux parfums capiteux. (Honaker 1994: 25)

While the findings from this study can be considered in part against a backdrop of existing corpora and frequency lists for French, there is a problem insofar as the data collected via an online survey are quite different from the data that make up existing corpora. For example, Vassiliou and Lammert's (2011) study of adjectives qualifying

[14] The adjective *âcre* (combing with *odeur* to give an MI score of 12.18 in the I-FR corpus) is found in L1 answers to question 3 (and with one occurrence also for question 4) (see Tables 7 and 8).

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the noun *odeur* makes use of the literary corpus Frantext[15] which, as the authors themselves concede, is very different from the type of data obtained through a survey or questionnaire. And Kleiber and Vuillaume's (2011b) semantic analysis relies essentially on literary sources to demonstrate certain qualities of *odeur*, with examples such as *odeur rugueuse des cigares* (Reverdy) and *odeur râpeuse des figuiers* (de Beauvoir). So, what of ordinary spoken language? The CLAPI database[16], which offers 63 hours of transcribed interactions in French, contains none of the adjectives previously cited, and there is only a handful of occurrences of *odeur* and *parfum*. And what of the types of authentic language samples learners are likely to encounter? We could follow the example given by Chambers (2009) and query the SCAODEYL European youth language corpus[17] only to find it has no occurrences of any of the afore-mentioned words; while its sister corpus BACKBONE[18] returns only two occurrences of *parfum*. And so on.

The fact that spoken corpora are typically far smaller than written corpora (for very obvious reasons) is only part of the problem. We must also consider the fact that whole swathes of ordinary language use are not covered by existing corpora. Nonetheless, in reference to the adjective collocates for *odeur* and *parfum*, it would not be extravagant to assume that non-natives do not have the same pool of uses and associations that natives are able to draw upon. It is therefore reassuring to see high frequency *passe-partout* adjectives such as *bon* and *mauvais* coming through in both sets of speakers, while it is not surprising to see more literary-style high MI forms present in L1 answers.

6. Conclusion

There is no space here for probing further into certain issues such as age and gender differences or how individuals may be more or less semantically or collocationally inclined. Also, there may be various L1 influences (whether linguistic or cultural) which can be more or less affected or countered by the choice of stimulus word (frequency, degree of abstractness, polysemy, cognateness, etc.) and the particular level of L2 mastery (Meara 2009, Zareva & Wolter 2012). It is hoped that by conducting this type of enquiry we can gain knowledge of the linguistic means of dealing with particular experiences. Furthermore, by looking at L1-L2 differences, it may be that some of the difficulties and complexities of the categorisations themselves (cf. Candau &

[15] http://www.frantext.fr/.
[16] http://clapi.ish-lyon.cnrs.fr/.
[17] http://www.um.es/sacodeyl/.
[18] http://webapps.ael.uni-tuebingen.de/backbone-search/.

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Wathelet 2001), and how they are played out in language, will be better understood. The types of differences hinted at here between L1 and L2 groups highlight the potential for a fine-grained study of higher levels of acquisition (Forsberg Lundell *et al.* 2014), but they also suggest the all-important need for specific focus on contextual information in input in second language learning (Ellis 2002). The question of exactly how (and how much) input leads to the forming of associations and ultimately to acquisition remains, not least due to the complexity of qualitative issues and the difficulty in assessing the extent to which implicit uptake and active learning interact.

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Appendix

The full questionnaire comprised 14 questions, 7 of which pertained to olfaction and 7 of which were concerned with metadata. Questions 1 to 4 and 8 to 14 were obligatory.

[1-4. See section 3.1.]

5. Connaissez-vous des expressions en français qui concernent les odeurs ou les parfums (ou qui contiennent ces mots) ? Si oui, pouvez-vous les citer et les expliquer ?

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6. Connaissez-vous des expressions dans d'autres langues qui concernent les odeurs ou les parfums (ou qui contiennent ces mots) ? Si oui, pouvez-vous les citer avec des explications (et une traduction) ?
7. Si vous deviez inventer une expression en français liée au monde des odeurs/parfums quelle serait-elle ?

[8-14. Additional information on respondents: L1, age, gender, occupation, etc.]

A total of 301 answers were returned, of which 298 were usable. Of these, 235 were self-declared L1 French speakers, and the 63 remaining formed the L2 French group.

The main country in which the L1 respondents were based at the time of answering was France. L2 speakers were often based in a/the country traditionally corresponding to their given L1. The 63 L2 speakers form a mixed group, with a majority of Europeans and Scandinavians. All non-natives were asked to give their self-assessed level in French following the basic descriptors of the Common European Framework of Reference. Answers ranged from A2 to C2, with a majority of higher levels (C1 and C2).

Roughly one half of all respondents were aged between 20 and 30, with a reasonable spread across the other age brackets (declining towards the upper limits). The two most common occupations of the respondents were student and teacher, with a wide range of other mainly qualified (though not exclusively) occupations and professions. Roughly three-quarters of all respondents were female. Within the separate groups (L1 and L2), the basic sociodemographic pattern was fairly similar.

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