Algae as Conventional Food: the Role of Analogy in Changing Consumer Perception

Master's Thesis

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Algae as Conventional Food: the Role of Analogy in Changing Consumer Perception

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Abstract

In the current study the influence of analogy learning on knowledge of algae was analysed. It was tested whether analogy could stimulate people to perceive algae as alternative to conventional food products. A 3 x 2 design was used, where a combination between three types of analogy learning (surface, relational and literal similarity) and two types of conditions (control, analogy) was tested. The results showed that any type of analogy learning did not always create the same schema overlap between a target (algae) and a base (conventional product). The effectiveness depended on a product, which was used as a base for analogy drawing, and features of a base that were useful for comparison. Naming or non-naming a base did not influence a degree of schema overlap. Second, analogy stimulated people to transfer affect from a base to a target, but the mechanism of this transfer was unclear. Regarding a degree of affect change, it was almost identical between all six conditions. Third, analogy could induce people to perceive a target and a base as alternatives. However, there was no a strong evidence that one type of analogy learning would be more effective than others. Lastly, perception of a target and a base as alternatives could predict partly a buying behaviour towards algae.

Key words: algae, conventional food, analogy learning, surface similarity, relational similarity, literal similarity, schema overlap, consideration as alternative.

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Introduction

Algae are eukaryotic organisms, ranging in size from several micrometres to meters (Carlsson et al., 2007). Since mid-50's Western researchers consider algae as a prospective food source, which can partly satisfy needs of growing population (Krauss, 1962). Generally, there are two basic reasons why algae can be a prospective food source. First, both micro- and macro-algae have high growth rate in a short term, while technological aspects of cultivation are relatively simple for macro species (Plaza et al., 2008). The second reason is that algae contain a range of different nutrients, including bioactive compounds: omega-3 fatty acids, beta-carotene, antioxidant bio peptides, vitamins, minerals, proteins, oils and fibres (Becker, 2007; Fan et al., 2014; Wolkers et al., 2011; Raven & Giordano, 2014).

Moreover, algae are sometimes called "*sea vegetables*", because they are considered as appropriate alternatives to some land plants (Netalgae, 2012; Nagappan & Vairappan, 2014). A potential of algae to be "*a new source of valuable nutrients for human and animal consumption*" is acknowledged by the European Commission (Joint Research Centre, 2014). It supports different projects and initiatives with the purpose to develop a stable production of algae in Europe. Likewise, several European companies already use algae for producing food products (Netalgae, 2012). However, in spite of these actions, algae are still not a part of a daily diet in Europe.

So far algae can be found in either health food stores or regular supermarkets in the Asian food department. Due to the high bioactive and nutritional content (Holdt & Kraan, 2011) algae are often positioned as functional food products on the European market. A lot of functional products were launched, but only a few succeeded the last decades (Siegrist et al., 2015), because of a low consumer acceptance (Verbeke, 2005). For these reason, positioning algae as a functional food may not be a good way to popularize algal products among broader category of European consumers. Similarly, presenting algae as purely Asian food is not a best decision, since it may result only in the occasional consumption (e.g. visiting Asian restaurants or preparing Asian dish). Therefore, algae producers face a problem how to re-position algae in order to reach a higher consumer acceptance.

The centuries-old experience of using algae as a human food can provide some clues about alternative product niche. It is known that algae are a common part of a daily ration in Asian countries. They are consumed as a separate dish (e.g. salad, starter, snack) or as a component of soups, noodles, or rice meals. Similarly, dried algae are conventional snacks and food ingredients in Iceland (Warwicker & Taylor, 2012). Thus, algae have a potential to be presented as a conventional food product, because algae can be components of numerous dishes and not just be "*the wrap that keeps rice together in sushi*" (Holdt & Kraan, 2011. p. 543).

For presenting algae as conventional food, it is necessary to show that algae is similar and relevant to this product category, otherwise consumers reject to link algae to conventional food due to a lack of prominent resemblance (Loken & Ward, 1990). An object is considered as relevant to the category only when it shares attributes with this category (Tversky, 1977; Goldstone et al., 1991; Yamauchi & Markman, 2000). Likewise, two objects can be considered as alternatives, only when they are resemble (Johnson, 1988). When people face a particular object they try to recall information about a category that has been recently matched by this object (Lajos et al., 2009). However, the majority of European consumers do not associate algae with convectional food nowadays, so they do not have a pre-stored knowledge about their similarity to retrieve quickly and to form a match. Thus, it is necessary to adjust consumer knowledge of algae in such way that similarity between algae and conventional food will be obvious and easily accessible. So far there is no research conducted about how consumer knowledge of algae can be influenced in order to link algae to other relevant product categories such as conventional food. This is surprising, since the potential of algae to be a part of regular diet is acknowledged by scientists (Fleurence et al, 2012; Nagappan, & Vairappan, 2014) and food activists, who have developed a great variety of dishes with algae by now.

In the light of the above, the main aim of this research is to contribute to a process of presenting algae as conventional food on the European market. It will be done by investigating how consumer knowledge of algae can be expanded to stimulate consumers to consider algae as alternatives to conventional food. Based on this the following research questions have been formulated:

- *How can consumer knowledge of algae be expanded by means of other relevant food knowledge?*

- *How can this expanded knowledge stimulate consumers to consider algae as alternatives to conventional foods?*

To reach the aforementioned research goal, the following steps will be made. In the first chapter of the present thesis, a literature analysis will be conducted. Papers about mechanisms of consumer knowledge organization, formation and change will be studied. The aim of this part to understand what means can be used for adjustment and expansion of knowledge. In the second chapter, a selected research methodology and stimuli will be described. In the third chapter collected data will be analysed and results will be described. Finally, conclusions, limitations and implications will be presented in chapter four.

1. Theoretical framework

This chapter describes an outcome of the literature analysis and a selected theoretical perspective. In a section 1.1 a categorization theory is analysed in respect to the research goal. In a section 1.2 reasons of selecting analogy learning theory is provided. Lastly, in sections 1.3-1.5 formulated research hypotheses are presented.

In the current consumer research literature, categorization and analogy learning are the topics that are closely associated with topics of similarity, organization and formation of product knowledge. A range of studies have showed that applying categorization approach can help to understand how people "*mentally represent products*" (Ratneshwar et al., 1996, p. 240), as well as how they organize and process information about perspective category members (Basu, 1993). Besides that, categorization is a useful tool for predicting consumer acceptance of products (Lajos et al., 2009).

As for analogy learning, it is assumed that *"the ability to think analogically is central to human cognition"* (Kurtz et al., 2001, p. 417). Analogy drawing is often used in marketing for brand extension and presentation of renewed products, since analogies can be considerably convincing (Roehm & Sternthal, 2001; Gregan-Paxton, 2001). Analogy stimulates people to notice similarities between two independent domains, representing different products in their mind (Krawczyk et al., 2005). Consumers can learn about a product from the pre-existing knowledge of comparable products (Gregan-Paxton & John, 1997).

Both approaches are seen as prospective for the algae case, because they can shed a light on the issue how consumers form and adjust knowledge of products. These topics will be studied with the aim to find out what approach can be used for influencing consumer knowledge of algae.

1.1 Categorization

Categorization theory is applicable to the algae case, because it may help to change and expand knowledge of algae. If a product becomes a member of a particular category, category knowledge is transferred to this product (Moreau et al., 2001) that allow making new inferences about it (Sujan & Dekleva, 1987). In general, categorisation is a process of sorting and grouping objects based on surface and relational similarity (Ahn & Medin, 1992). Consumers have a specific product category for every product in their mind, which is based on the combination of attributes and links between these attributes (Stayman et al., 1992). These combinations define how a product category is (dis)similar to other product categories stored in memory (Meyers-Levy & Tybout, 1989). Therefore, the success of product fit in a particular product category depends on a fact to what extent product attributes are (in)congruent with a this category.

When a product contains of remarkably incongruent attributes, either a new independent category will be created or a target object will be accommodated into the existing product category (Mandler, 1982). Accommodation is a process of re-structuring existing categories in order to fit a new product, which possesses both congruent and incongruent features (Mandler, 1982). During accommodation a so-called sub-typing process can occur, which is expressed in creating new sub-categories inside of existing product category (Lajos et al., 2009).

Returning to the algae example, it seems that accommodation with sub-typing can occur in a case of fitting algae into a conventional food category. Algae may be accommodated into a conventional food category, but this fit will demand considerable cognitive effort, since algae include incongruent attributes besides congruent ones. Categories are strictly organized and structural adjustment is effortful process, since categorization requires a relatively comprehensive match of attributes between a target and a base (Ahn & Medin, 1992; Gregan-Paxton & Moreau, 2003; Miller et al., 2006). Subsequently, the accommodation of a partly incongruent object into existing category often leads to a negative attitude towards this object (Stayman et al., 1992). The reason of such negative outcome is that this kind of extensive cognitive task is "*more frustration than resolution*" (Meyers-Levy & Tybout, 1989, p. 40). People may feel that the outcome is worth less than applied cognitive resources. For this reason, restructuring conventional food product categories in order to fit algae can result in a negative affect addressed to algal product. Since categorization can lead to undesirable results, it is not a best approach for changing consumer knowledge of algae.

1.2 Analogy learning and schema

Analogy learning is often associated with categorization, since both mechanisms relate to mental connection of objects. Compared to categorization, analogy learning allows more flexible knowledge restructuring, because it demands only partial resemblance of objects to link them (Genter & Forbus, 2011). In general, analogy learning is the process of knowledge transfer from one mental domain to another, which is aimed to highlight and link similar features between them (Clement & Gentner, 1991).

The Consumer Learning by Analogy model (CLA) includes three stages (Gregan-Paxton, 2001). The first stage is access. It represents an activation of a base, which features will be transferred to a target (Gregan-Paxton & John, 1997). The second stage is 'mapping'. During this stage similar attributes between a target and a base are explicitly identified and configuration of links between them is built (Spellman & Holyoak, 1996). The last stage of CLA is the knowledge transfer itself, when a connection is finished and knowledge of a base communicated to a target (Gregan-Paxton, 2001).

As a result of analogy learning, a new schema representing a combination of features shared between a target and a base is created (Gregan-Paxton & John, 1997; Gentner & Forbus, 2011). Schema is a knowledge cluster, which contains some information about an object (Sujan & Bettman, 1989). A schema can be an outcome of overlap between two mental domains (Gick and Holyoak, 1983). This kind of schema is not a solid part of a base or a target, but it is like a border between two states, which belongs to both and none at the same time. Analogy extends both a target and a base, and these extensions overlap with each other. Thus, analogical learning allows creating links between two previously unrelated mental domains.

In the light of the above, it can be assumed that analogy learning can be an appropriate tool for influencing consumer knowledge of algae. It helps to expend knowledge of a target by transferring knowledge of a base. Moreover, during analogy learning people mainly focus on similarities between a base and a target, while dissimilarities are ignored, since people do not expect an absolute match between two domains (Gentner, 1983, Gregan-Paxton & Moreau, 2003). It allows avoiding uncomfortable affective state associated with the accommodation of incongruent cues. Then, flexibility of a schema created by analogy can lead to higher degree of acceptance among consumers. For example, the statement *"Algae are vegetables"* can be negatively evaluated by consumers after elaboration of features. They can feel tricked with this claim, because they know that algae are unable to absolutely match product category 'Vegetable'. In a contrast, the claim "*Algae are like vegetables*" will less likely lead to consumer dissatisfaction, since they do not assume the absolute similarity between them. It is easier for consumers to accept such softened claims. For creating a shared schema between a conventional food product and algae (figure 1) the appropriate analogical approaches should be used. These approaches will be described in section 1.3.

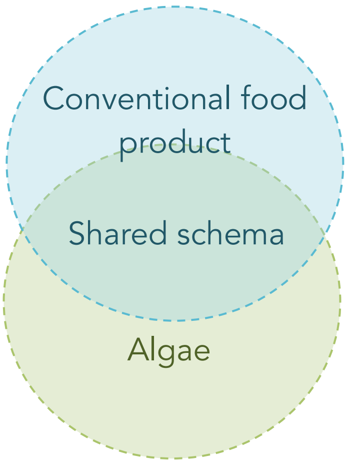

Figure 1. The assumed result of analogy learning

1.3 Types of analogy learning

Two kinds of features can be used for drawing analogy between a target and a base. According to Holyoak & Koh (1987) these features can represents physical properties (e.g. colour, texture) or abstract qualities (e.g. functionality, relation to other objects, outcome). The type of analogy learning depends on what kinds of features are used. The first type of analogy learning is a surface similarity, which uses only physical properties for drawing analogy between a target and a base. (Clement et al., 1994; Gregan-Paxton & John, 1997). For example, the analogy can be built between lychee and white grape based on such physical properties as: juiciness and sweetness. The second type is relational similarity that utilizes only abstract qualities for this purpose, meanwhile physical properties are ignored (Gregan-Paxton & Moreau, 2003). To illustrate, oranges and nuts are perceptually different objects, but both evoke allergic reaction, which is an outcome (abstract quality). The last type is literal similarity, which is a combination of the previous types. In this case, analogy learning is based on physical properties and abstract qualities simultaneously (Gentner, 1983). For instance, the following analogy can be drawn: "Soup is like a tea, it's liquid (physical property) and it provides warming effect during consumption (abstract quality)".

Analogy learning by means of abstract qualities is often considered as more effective compared to analogy learning based on merely physical properties. The reason is that people evaluate matches between abstract qualities as more important than matches between physical attributes (Gentner et al., 1993). Moreover, products are often organized in memory by virtue of their abstract qualities (Ratneshwar et al., 1996; Gentner et al., 1993). Regarding analogy learning based on a match of physical properties, it creates a weaker effect, since only a little overlap of features can be reached with it (Gregan-Paxton & John, 1997). Though, physical properties are seen as more salient for comparison than abstract qualities (Clement et al., 1994; Gentner, 2003).

Getting back to the algae, literal similarity and relational similarity may suit more for analogy learning between conventional foods and algae. These two types are supposed as preferable, because abstract qualities are deeper integrated into a base that can lead to formation of more solid connections and matches with a target. Analogy learning by means of surface similarity is also applicable for the algae case. It is able to create easily recognizable links between the base and the target, but the outcome of transfer will be limited. Lastly, literal similarity may result in more comprehensive overlap between the target and the base, because it allows combining benefits of other types of analogy learning. Based on the aforementioned information, the following hypotheses have been formulated:

H1a: In a case of analogy learning based on surface similarity, a schema overlap between a base and a target is evaluated as minimal.

H1b: In a case of analogy learning based on relational similarity, a schema overlap between a base and a target is evaluated as moderate.

H1c: In a case of analogy learning based on literal similarity, a schema overlap between a base and a target is evaluated as considerable.

1.4 Analogy learning and affect

Despite that analogy learning is a cognitive process, it can probably stimulate affective reactions on occasion. According to Johnson & Stewart (2005, p. 5) affect *"is a blanket term that includes emotions, as well as mood and attitude"*. For a long time cognition and affect were treated separately, but so far the interrelatedness between them has been underpinned by a range of theoretical models and supported by numerous experiments (Forgas, 2008). Periodically, affective reactions can arise from cognitive processes (Bagozzi et al., 1999). For example, attitude towards a category can be transferred to a new object currently linked to this category (Nan, 2006; Garbarino &

Edell, 1997). Likewise, according to Fiske & Pavelchak (1986) attributes inside a schema can be linked to the so-called 'affective tags', which are affective values. Subsequently, they can form a general affective tag for a schema (Fiske & Pavelchak, 1986). This affective tag can be communicated to a new target object, matching this schema (Fiske & Pavelchak, 1986). Bearing in mind these findings, it can be proposed that a similar transfer of affect can occur in case of analogy learning.

As mentioned before, the different kinds of features can be transferred from a base to a target during analogy learning. These features can include affective reactions embodied into a base. However, the affect cannot be directly transferred from a base to a target, because the target is indirectly connected to a base via a shared schema. So that, the transfer of affect would include several stages. During the first stage the affective features of a base are communicated to a shared schema. As a result, this schema starts being associated with the base-related affect. In the second stage, the base-related affect is finally transferred to a target from the new-shared schema, since the target is directly linked to this schema based on the mapped features. Therefore, it can be proposed that:

H2: Affect is transferred from a base to a target via a shared schema.

Furthermore, it is assumed that strength of affect communicated to a target can vary depending on a size of a schema. The more extensive schema overlap the stronger change in target-related affect should occur. Conforming to this assumption, the following hypothesis is formulated:

H3: A change of target-related affect increases with expanding schema overlap.

1.5 Consideration as alternatives

According to Bettman & Sujan (1987) people compare products based on two types of features. First type is the physical feature (e.g. taste), which is obvious and integral for products. The second type is abstract feature (e.g. affect, outcomes) that is intangible and comprehensive. The comparability of two alternatives is determined by the degree of similarity of their features (Johnson, 1984). If two products share a wide range of features, they are considered as comparable (Johnson, 1988).

As mentioned before, analogy learning highlights the similar physical and abstract features of a target and a base, by creating solid links between them (Gregan-Paxton, 2001). According to Holyoak & Koh (1987) activation of a particular feature or set of features leads to recall of other objects, having these features. Shared schema makes two previously unrelated objects comparable and resemble. In other words, an outcome of analogy learning transforms a target and a base into alternatives by providing salient criteria for comparison, which significantly influence the final decision (Bettman & Sujan, 1987). In addition, the transferred based-related affect can be an extra stimulus during comparison. Due to the analogy leaning it becomes shared abstract feature, and as known from the literature the abstract features can be periodically dominant stimuli for comparison (Johnson, 1988). In the light of the above, the following hypothesis was formulated:

H4: A schema overlap and transferred affect stimulate to consider a target product as an alternative to a base product.

2. Methodology

2.1 Sample

The participants were students of Wageningen University. They were recruited by emails sent to their University accounts. These emails contained an invitation to participate in the research, information about the research and a link to the online questionnaire. Overall, 206 participants were recruited.

2.2 Design

Table 1 shows a 2 x 3 design of the experiment. The rows represent independent variable 'Type of analogy learning', which includes three categories. Each category corresponds to a kind of features that will be transferred from a base to a target. The columns reflect the type of conditions that is used in the experiment, to wit: analogy condition and control condition. In the analogy conditions (1,3,5) algae, two products (spinach and potato chips) and their features (see a section 2.3) are simultaneously presented to the same participant. In the control conditions (2,4,6), only features of both products and algae are presented simultaneously to the same participant.

Table 1. Research design

	Surface similarity (physical properties)	**Relational similarity** (abstract qualities)	**Literal Similarity** (physical properties & abstract qualities)
Analogy	Condition 1	Condition 3	Condition 5
Control	Condition 2	Condition 4	Condition 6

2.3 Stimuli

Stimuli for drawing analogy with algae were selected in two steps. First, an initial list of conventional food products was generated, which included: salad leaves, flatbread, bacon stripes, potato chips, spinach, leek, pasta and lasagne leaves. These products were selected, because of the resemblance to algae based on physical properties and abstract qualities. For example, brown alga Dulse has brown colour and savoury flavour, as well as its new strain tastes like bacon in fried form (Langdon et al., 2015). In addition, these products are common part of daily diet in the European countries and well known by consumers.

Second, all selected products were trialled in order to find what regular product could be considered as the most reliable base for analogy drawing. A short questionnaire was spread via social media for this purpose. It contained eight stories, drawing analogy between algae and selected products, as well as several questions that were aimed to investigate participants' opinion about every pair 'algae – conventional food product'. Consequently, the following products were chosen: potato chips and spinach. Afterwards, for every selected product a list of features were generated and classified according to three types of analogy learning. The summary of stimuli-related features is presented in table 2.

Table 2. Selected products and their features

Product	**Surface similarity** (physical properties)	**Relational similarity** (abstract qualities)	**Literal similarity** (physical properties & abstract qualities)
Spinach	- green colour - soft texture - smooth surface - fresh.	- can be blended into omelette or pie. - can be added to salads and sandwiches - can be used to decorate dish.	physical properties & abstract qualities of spinach.
Potato chips	- texture (crunchy, dry) - salty flavour - different colours - wavy surface.	- consumed between meals - short satiety effect - can be served as bar snack.	physical properties & abstract qualities of potato chips.

2.4 Measures

Schema overlap

This measure was designed to test Hypotheses 1a, 1b and 1c. It reflected the extent of the overlap between a target and a base, which was reached by applying a particular type of analogy learning. In other words, it showed how (in)effective the analogy was. The schema overlap was presented in a graphical form (figure 2). This graphical representation was adopted from the research of Aron et al. (1992) and Tropp & Wright (2001), where it had been used to show a degree of overlap between two concepts.

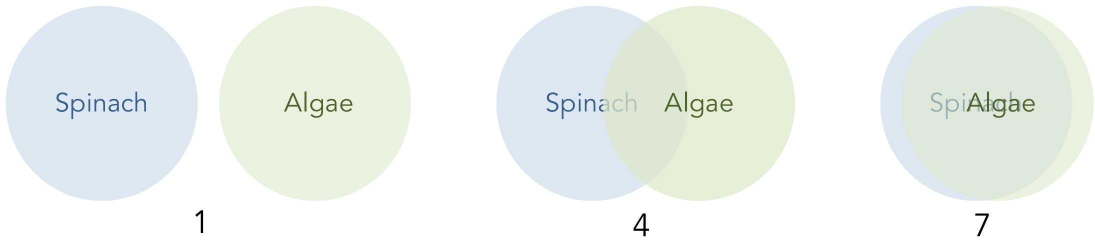

Figure 2. Graphical representation of a schema overlap (selected items)

Every picture was linked to a numeric value from 1 [no overlap] to 7 [almost complete overlap]. For example, if picture demonstrated a moderate overlap between the base and the target the corresponding number was 4.

Affect towards products

This measure was designed to test Hypothesis 2. It was aimed to investigate to what extent the change in affect towards algae was explained by affect of a base. 'Affect towards products' was measured by applying five 7-point semantic-differential scales. The items for measuring affective reactions were adopted from the research of Crites, Jr. et al. (1994) and Aikman & Crites, Jr. (2007). The following word pairs were selected: disgusted/acceptance, unsatisfied/satisfied, sad/delighted, bored/exited, tense/calm.

Affect towards algae

This measure was designed to test Hypothesis 3. Affect towards algae was measured two times before and after presenting stimuli. Double measurement was aimed to check whether any changes in affect occur after manipulation. Also, it measured how strong the change was. To measure 'Affect towards algae' the same semantic-differential scales were used as for 'Affect towards products'.

Consideration as alternatives

This measure was designed to test Hypothesis 4. Its aim was to investigate whether outcome of analogy learning stimulates people to consider algae and conventional foods as alternatives. The following statement was presented to the participants, *"Algae can be alternatives to spinach/potato chips*". The statement was followed by a Likert scale, which was reflected the participants' opinion, ranging from '1 – Strongly disagree' to '7 – Strongly agree'.

2.5 Pilot

The pilot test of the questionnaire was launched to identify the prospective pitfalls. Overall, 72 participant took part in the pilot test in return to a chance to win an algal chocolate bar. However, only 51 out 72 participants completed the questionnaire at full. Besides filling in the questionnaire, participants were asked to provide feedback towards readability, clarity and reliability of the texts and questions, as well as about technical problems. Consequently, the following results were obtained. The main problem was a 100-points slider scale that was initially used for measuring affect. The participants mentioned that they were confused with such wide range of choice and did not find it really appropriate for a bipolar measure. Therefore, it was decided to replace it by the aforementioned 7-point scale.

The second issue also concerned affect measure. Several participants admitted that they spent a lot of time guessing about meaning of some words, which were placed on the ends of the sliders, measuring affect. To solve this problem, an instruction was added, which explained that the words could be interpreted based on the first meaning coming in mind. It was decided not to add an explanation of the words for two reasons. First, there was no explanation of the words given in the original research, from which they were adopted. Therefore, giving self-produced meanings could influence the perception of scale. Second, the measure was aimed to determine a transfer of affect, not affect per se. Thus, how participants interpret the meaning of items was not critical for this measure.

Then, there was a request to specify a kind of algae that were described in every story (dry algae or fresh algae). However, there was a problem with solving this issue, since adding words 'dry' and 'fresh' could influence the purity of relation similarity conditions, where no physical properties had to be used in the description. For instance, saying "*Dry algae like potato chips, because they have a short satiety effect*" instead of "*Algae like potato chips, because they have a short satiety effect*" transforms a relational similarity condition into literal similarity. The reason is that a physical property (dry) is presented together with an abstract quality (short satiety effect). To minimize the confusion to some extent, it was decided to mention that stories described two types of algae that were processed in different way. It might at least give participants a clue that algae were proceed in such way that made them similar to potato chips or spinach. Lastly, some participant suggested highlighting words 'spinach' and 'potato chips' in the question about affect, since they confused them with an identical question about algae. These words were made bold and underlined.

In addition, the data collected during pilot test was used for preliminary statistical testing. The five items used for measuring affect in respect to algae or products were analysed by applying Cronbach's α. This test was aimed to identify whether they were reliable and measured the same construct. The obtained results were presented in table 3.

Table 3. A pilot measurement of Cronbach's α

Measurement of affect	Cronbach's α
Initial affect towards algae	.673
Affect towards algae after manipulation	.803
Affect towards spinach	.884
Affect towards potato chips	.828

As it can be seen from the table 3, in majority of cases the reliability of scale, measuring affect, was high with Cronbach's α >.8. The only exception was 'Initial affect towards algae', which Cronbach's α almost reached the reliability level. The reason of lower Cronbach's α was a low correlation of two items 'tense/calm' r=.288 and 'bored/excited' r=.213 with the total. It was decided to keep these items, because this problem was absent in other three measures of affect (e.g. Affect towards spinach), where the same five items were used.

2.6 Procedure

The data was collected by means of the online questionnaire (Appendix I) that was sent to students' accounts via email. All recruited participants were randomly allocated to one out of six conditions by online-survey software Qualtrics. Similarly, the questions and scales inside every section were randomized on purpose to reduce impact of order bias.

In the first section of the questionnaire the short introduction about the research was provided. In the second section a brief cover story about algae was given. Then, it was followed by the questions about 'Affect towards algae'. In the next section stimuli were presented to the participants one by one. In the fifth section the participants were asked to select a picture for the measure 'Schema overlap', corresponding to their opinion towards each product. In the sixth section there was the second measurement of 'Affect towards algae'. Then, participant had to assess the presented product pairs according to the measure 'Consideration as an alternative' in section seven. In the section eight participants evaluated every base product towards the measure 'Affect towards products'. Afterwards they were asked extra questions about knowledge of algae. Finally, demographic data was collected and acknowledgement for the participation was given.

3. Results

3.1 Descriptive statistics and reliability

Overall, 206 participants took part in the study and 144 completed the questionnaire at full. The dropout rate was 30.1 %. From the total number of participants 71.5 % (N=103) were female and 28.5 % (N=41) were male. The average age was 23.9 (SD=3.84). The majority of participants were European nationals 79.4 % (N=114) and the rest had other nationality 20.6 % (N=30).

Regarding knowledge of algae, 92.4 % (N=133) of participants heard about algae before and 7.6% (N=11) did not know about them. The number of participants, who consumed algae before, was 50.7 % (N=73) and those participants, who did not try it, was 49.3 % (N=71). The results towards frequency of consumption were unequally distributed, to wit: 3.5 % (N=5) of participants consumed algae often or very often, 16.7 % (N=24) – occasionally and 79.9 % (N=115) – rarely or never.

The reliability of five scales used for measuring affect towards the algae and selected products were analysed by applying Cronbach's α. The reliability of all scales was high as determined by Cronbach's α presented in table 4.

Table 4. Reliability measurements (the main study)

Measurement of affect	Cronbach's α
Initial affect towards algae	.858
Affect towards algae after manipulation	.886
Affect towards spinach	.891
Affect towards potato chips	.868

Before applying the inferential tests the average of scores gained by five measurement of affect was found, and new combined variables was created: 'Initial affect towards algae' and 'Affect towards algae after-manipulation', 'Affect towards spinach' and 'Affect towards potato chips'.

3.2 Hypothesis testing

Hypothesis 1

To test Hypotheses 1a, 1b and 1c a Two-way ANOVA was applied, where 'Type of condition' and 'Type of analogy learning' were treated as the independent variables, and 'Schema overlap' as the dependent one. According to the results of the test for spinach, the main effect of the 'Type of condition' was not significant $F(1,138)=1.317$, $p=.253$, so a schema overlap obtained in the analogy and control conditions was not considerably different. There was a significant main effect of 'Type of analogy learning' on the gained degree of schema overlap between algae and spinach, $F(2,138)=3.317$, $p=.039$. According to the Tukey post hoc test, the schema overlap of surface similarity was weaker ($p=.030$) compare to relational similarity (figure 3). However, the mean of surface similarity was moderate that contradicted to Hypothesis 1a, stating that a minimum schema overlap had to be reached by this type. Also, since analogy and control condition did not differ the impact of naming a base was not obvious. Thus, H1a received some support, taking the shortcomings into account. The Hypotheses 1b and 1c were not confirmed, because a schema overlap created by them was not statically different.

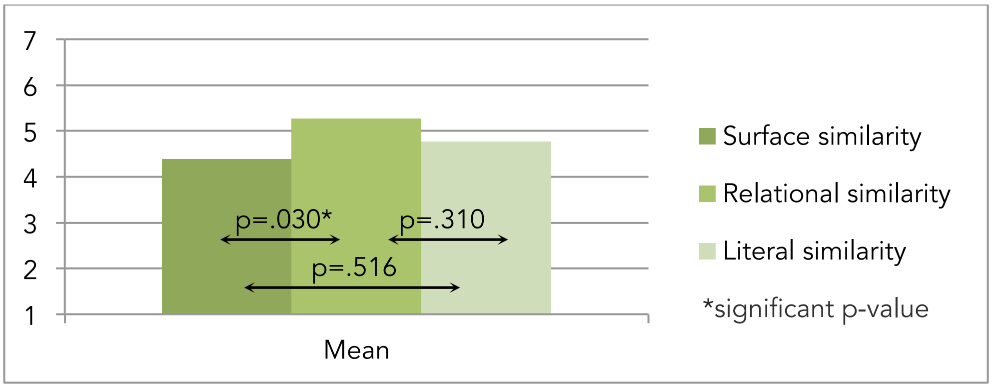

Figure 3. The mean difference of a schema overlap (spinach)

There was no significant interaction between 'Type of condition' and 'Type of analogy learning' $F(2,138)=.159$, $p=.853$. Therefore, there was no difference between conditions in the degree of schema overlap reached by different type of analogy.

For potato chips, the main affect of 'Type of condition' was non-significant F(2,138)=1.150, p=.285, while the main effect of 'Type of analogy learning' was significant F(2,138)=5.510, p=.005. However, the assumption of homogeneity of variance was violated for this analysis. For this reason, Games-Howell post hoc test was run for potato chips. The test revealed that surface similarity (p=.010) and literal similarity (p=.008) produced stronger schema overlap between algae and potato chips compare to relational similarity (figure 4). Figure 4 shows that all means fell in a region of minimal overlap ranging from 1-3. Thus, there was a little support found for H1c, because the overlap of literal similarity was minimal, despite it was more extensive than others. Regarding surface similarity, it created a minimal overlap that complied with the Hypothesis 1a. At the same time it exceed a level of relational similarity that contradicted with the initial research assumption. Lastly, the interaction between 'Type of condition' and 'Type of analogy learning' F(2,138)=1.743, p=.179, it was not significant. Hence, only Hypotheses 1a and 1c got some support. However, since the results of the control and analogy conditions have been similar, this conclusion should be treated with care.

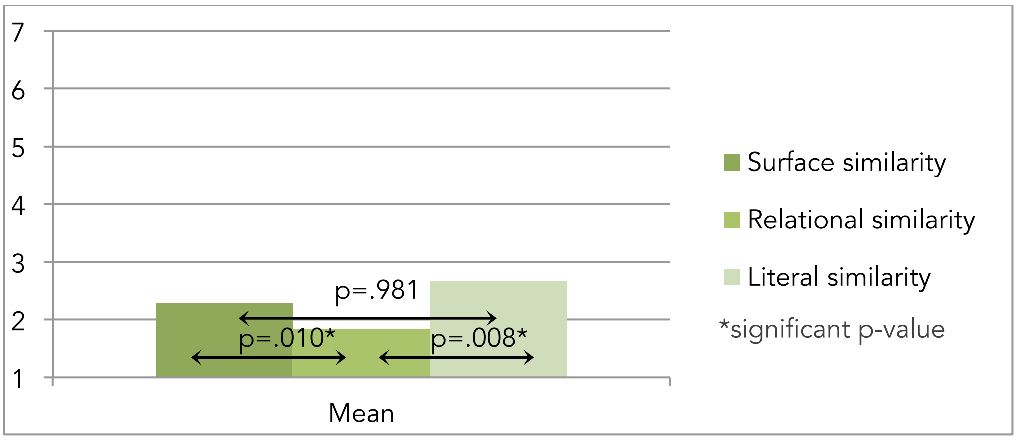

Figure 4. The mean difference of a schema overlap (potato chips)

Hypothesis 2

Hypothesis 2 was analysed by applying a Hierarchical Multiple Linear Regression, where 'Affect towards algae' was treated as a dependent variable. The 'Affect towards products', 'Schema overlap' and their interaction were predictors. The results of the test were split and sorted by 'Type of condition'.

In the control conditions, the predictors did not have any explanatory value in respect to the 'Affect towards algae': $F(4,67)=0.643$, $p=.633$ (without added interaction) and $F(6,65)=1.748$, $p=.124$ (with added interaction). Although the overall model did not explain affect change towards algae, adding interaction between 'Affect towards spinach' and 'Schema overlap of spinach' improved the predictive value of the model: F Change$(2,65)=3.846$, $p=.026$.

In the analogy conditions, the explanatory value of predictors of the 'Affect towards algae' was significant: $F(4,67)=5.730$, $p=.001$, R^2 adj.=.210 (without added interaction) and $F(6,65)=3.909$, $p=.002$, R adj.=.197 (with added interaction). Adding interaction did not increase the predictive value of the model, F Change$(2,65)=3.846$, $p=.637$. The regression coefficients of the models in the analogy conditions are presented in table 5. Table 5 suggests that only the affect towards spinach has been transferred to algae during analogy learning, while the affect towards potato chips has not been. Likewise, the schema overlaps did not add a predictive value into the models. Thus, Hypothesis 2 received a partial support, since affect was transferred, but a schema overlap did not play any role in this process.

Table 5. The regression coefficients predicting 'Affect towards algae'

Variable	B	SE	β	Sig.
Model without interactions				
Constant	4.690	.126		.000
Affect towards spinach	.578	.122	.505	.000
Affect towards potato chips	-.090	.097	-.100	.357
Schema overlap of potato chips	.023	.083	.030	.782
Schema overlap of spinach	.058	.081	.078	.480
Model with interactions				
Constant	4.696	.128		.000
Affect towards spinach	.579	.124	.506	.000
Affect towards potato chips	-.117	.103	-.130	.260
Schema overlap of potato chips	.028	.084	.036	.742
Schema overlap of spinach	.059	.082	.080	.473
Interaction for spinach	-.057	.088	-.078	.520

In addition to the main analysis, a Multiple Regression test was carried out to check whether the control and analogy conditions had a different predictive value. The interactions between the predictors and 'Type of condition' were added into the model for that purpose. The Multiple Regression Multiple Regression test revealed that the interaction effect (b=.526, p=.002) effect explained the difference of coefficients between the control conditions (b=.052, p=.654) and analogy conditions (b=.578, p=.000).

Hypothesis 3

To test Hypothesis 3, a Mixed ANOVA was applied to measure within-condition and between-condition difference in affect change towards algae. The 'Initial affect towards algae' and 'Affect towards algae after manipulation' were treated as within-subject variables, while 'Type of condition' and 'Type of analogy learning' as between-subject factors. The main effect of overall manipulation on the affect change was significant: F(1,138)=5.837, p=.017 (figure 5). Though, this change was quite small in all conditions.

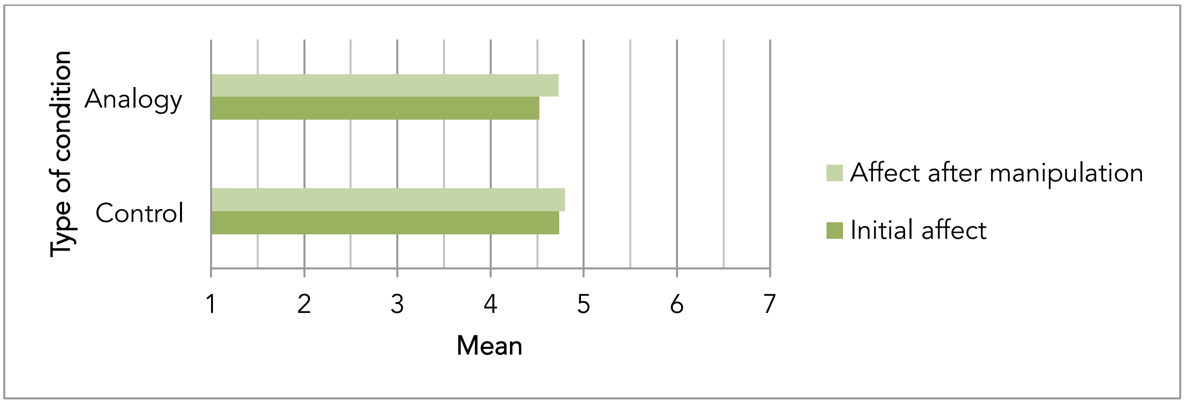

Figure 5. The change of affect between the analogy and control conditions

The main effect of 'Type of condition' was not statistically significant F(1,138)=.570, p=.451, so there no difference in affect change between the control and analogy conditions. The main effect of the 'Type of analogy learning' was significant, F(2,138)=3.719, p=.027. The Tukey post hoc test identified that surface similarity (p=.048) had a lower level of 'Affect towards algae' than literal similarity in the initial and after-manipulation measure of affect: (figure 6).

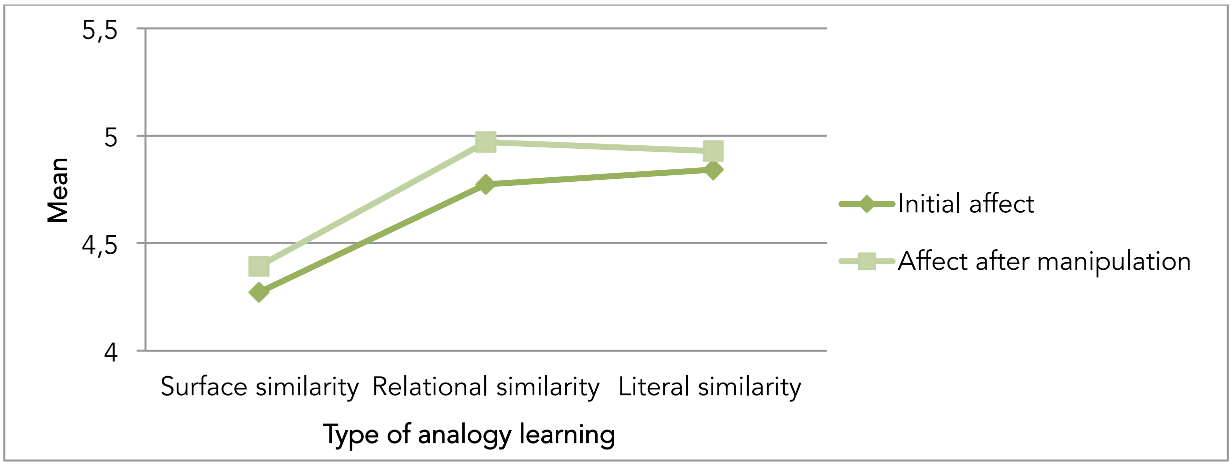

Figure 6. The mean difference of affects between the types of analogy learning

However, the difference in the 'Initial affect towards algae' was a signal that people from either the surface or literal similarity conditions might be different from others. Regarding the interaction between the 'Type of condition' and 'Affect towards algae', it was non-significant $F(1,138)=1.614$, $p=.206$. Hence, the affect towards algae changed similarly in the control or analogy conditions. There was no significant interaction between 'Type of analogy learning' and 'Affect towards algae' $F(2,138)=.330$, $p=.719$, so surface, relational and literal similarity led to almost identical results. Likewise, the results of the interaction between all independent and dependent variables was non-significant $F(2,138)=.692$, $p=.502$. Thus, there was no support for Hypothesis 3, stating that a change of affect had to increase with expanding schema overlap.

Hypothesis 4

To test Hypothesis 4 a Hierarchical Multiple Linear Regression analysis was used to identify whether the dependent variable 'Consideration as alternatives' can be predicted from the independent variables 'Schema overlap' and 'Affect towards algae after manipulation'. The outcomes of the test were split and sorted by the 'Type of condition'. The following results were obtained for 'Consideration as alternative to spinach'. In the control conditions, the explanatory value of predictors towards 'Consideration as alternative to spinach' was significant: $F(2,69)=15.018$, $p=.000$, R^2 adj.=.283. The results for the analogy conditions were also significant, since the model explained partly variance in the 'Consideration as alternative to spinach', $F(3,68)=20.171$, $p=.000$, R^2 adj.=.351. The regression coefficients, predicting 'Consideration as alternative to spinach' in the analogy conditions, are presented in table 6. Table 6 shows that both variables stimulate to consider algae as alternative to spinach.

Table 6. The regression coefficients of the 'Consideration as alternative to spinach'

Variable	B	SE	β	Sig.
Constant	5.039	.129		.000
Schema overlap of spinach	.435	.081	.517	.000
Affect towards algae after manipulation	.321	.108	.284	.004

Regarding potato chips, an almost identical picture was observed. The results of the control conditions were positive, since the 'Schema overlap' and 'Affect towards algae after manipulation' partly explained variance of the 'Consideration as alternative to potato chips': $F(2,69)=13.199$, $p=.000$, R^2 adj.=.256. For the analogy conditions, the model also had an explanatory value: $F(2,68)=19.712$, $p=.000$, R^2 adj.=.345. The regression coefficients, predicting 'Consideration as alternative to spinach in the analogy conditions, are presented in table 7. Table 7 shows that both 'Affect towards algae after manipulation' and 'Schema overlap of potato chips' stimulate people to consider algae and potato chips as alternatives.

Table 7. The regression coefficients of the 'Consideration as alternative to potato chips'

Variable	B	SE	β	Sig.
Constant	3.549	.164		.000
Schema overlap of potato chips	.515	.137	.368	.000
Affect towards algae after manipulation	.507	.105	.469	.000

Consequently, Hypothesis 4 was supported by results, since the 'Affect towards algae after manipulation' and 'Schema overlap' could explain 30-40 % of variance in the dependent variable 'Consideration as alternative'. However, since the outcome of control conditions were also positive 25-28 % of variance was explained, not naming a base could be also effective.

In addition to the main analysis, a Multiple Regression test was carried out to check whether control and analogy conditions had a different predictive value. The interaction between ‘Type of condition’ and predictors was used for this purpose. The test revealed that the interaction effect explained the difference of coefficients between control and analogy condition. The summarized results presented in table 8.

Table 8. The difference between conditions (a summary of regression coefficients)

Variable	B	SE	β	Sig.
Spinach				
Affect towards algae after manipulation (Control)	.423	.121	.352	.001
Affect towards algae after manipulation (Analogy)	.321	.108	.415	.004
Affect towards algae after manipulation * Type of condition	-.102	.162	.410	.532
Schema overlap (Control)	.338	.082	.415	.000
Schema overlap (Analogy)	.435	.081	.517	.000
Schema overlap * Type of condition	.098	.115	.080	.399
Potato chips				
Affect towards algae after manipulation (Control)	.489	.147	.345	.001
Affect towards algae after manipulation (Analogy)	.525	.137	.368	.000
Affect towards algae after manipulation * Type of condition	.037	.201	.018	.855
Schema overlap (Control)	.390	.117	.345	.001
Schema overlap (Analogy)	.512	.105	.469	.000
Schema overlap * Type of condition	.122	.157	.080	.439

Finally, an additional Two-Way ANOVA test was run to check weather ‘Consideration as alternatives’ differ between conditions and type of analogy learning. Test for spinach showed that the main effect of the ‘Type of condition’ was non-significant: $F(1,138)=.198$, $p=.657$. The main effect of the ‘Type of analogy learning’ was significant: $F(2,138)=10.798$, $p=.000$. The Tukey post hoc test revealed that surface similarity reached a significantly lower level of the ‘Consideration as alternatives’ than relational similarity $p=.000$ and literal similarity $p=.001$ (figure 7). The main effect of interaction between variables was non-significant $F(2,138)=.439$, $p=.645$.

Concerning potato chips, the main effect of ‘Type of condition’ was non-significant: $F(1,138)=.061$, $p=.805$. The main effect of ‘Type of analogy learning’ was not clear, since it was almost non-significant F(2,138)=3.177, p=.045. The Turkey post hoc test demonstrated that there was no a statistically significant difference between all types of analogy learning. Therefore, the main effect 'Type of analogy learning' was finally considered as non-significant. The main effect of interaction was highly non-significant F(2,138)=.002, p=.998.

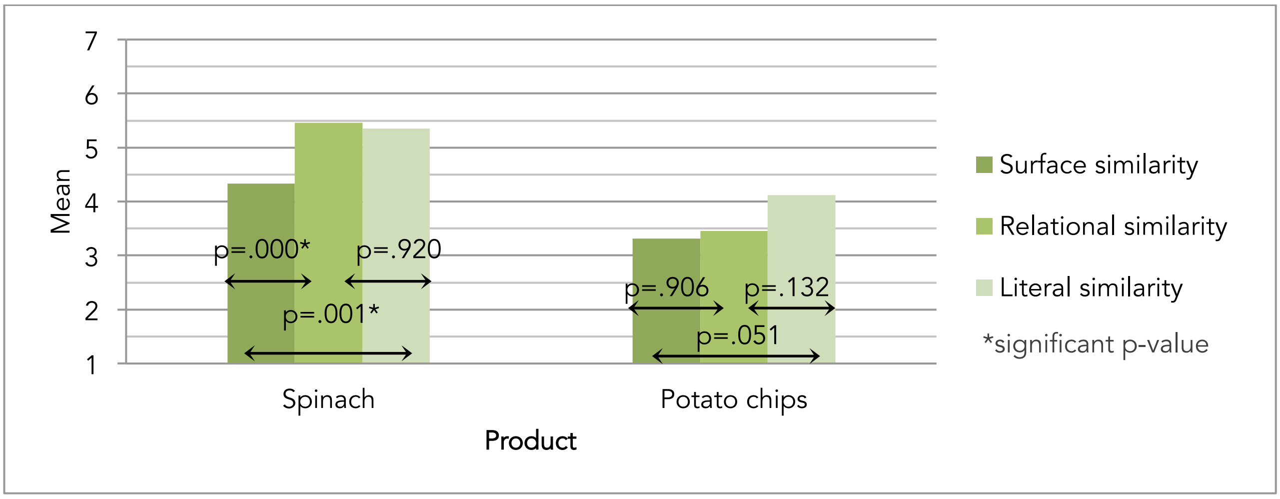

Figure 7. The mean difference of the 'Consideration as alternatives'

Extra test 'Buying behaviour towards algae'

Despite that there was no hypothesis generated to check an influence of analogy on 'Buying behaviour towards algae', it was decided to check whether it could to do so. First, a Multiple Linear Regression test was applied, where the 'Consideration as alternatives' was an independent variable. According to the outcome, the 'Consideration as alternatives' could predict the 'Buying behaviour towards algae', because the results were significant: F(2,69)=10.476, p=.000, R^2 adj.=.211 (the control conditions) and F(2,69)=10.476, p=.000, R^2 adj.=.246 (the analogy conditions). For the analogy conditions, the regression coefficients of the 'Buying behaviour towards algae' demonstrated that all variables contributed into the explanatory value of the model. The 'Consideration as alternative to spinach' had b=.253, p=.001 and 'Consideration as alternative to potato chips' had b=.170, p=.004.

Second, the Two-Way ANOVA was run to check whether the 'Buying behaviour towards algae' differs between the 'Type of conditions' and 'Type of analogy learning'. The outcome revealed that the main effect of 'Type of condition' was non-significant, $F(1,138)=2.797$, $p=.097$. Therefore, naming of a base did not influence buying behaviour. The main effect of 'Type of analogy learning' was significant $F(2,138)=4.330$, $p=.015$, showing that surface, relational and literal similarity produced a different level of the 'Buying behaviour towards algae'. Conforming to the Tukey post hoc test, the 'Buying behaviour towards algae' of relational similarity was higher ($p=.012$) compared to surface similarity (figure 7). Hence, presenting algae together with abstract qualities of conventional products led to better results than in case of physical properties. In general, 'Buying behaviour towards algae' was neither high or low ($M=3.032$), demonstrating that majority of participants were willing to buy it occasionally.

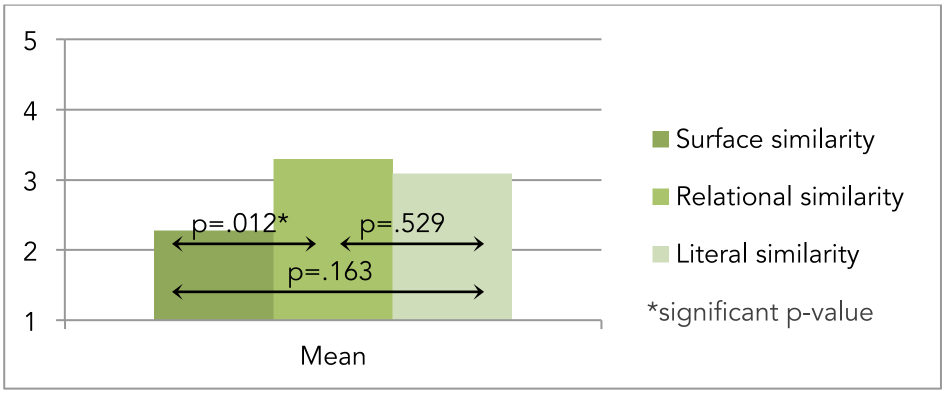

Figure 7. The mean difference of the 'Buying behaviour towards algae'

Concerning the interaction between 'Type of condition' and 'Type of analogy learning', it was not significant $F(2,138)=.473$, $p=.624$. This meant that the level of 'Buying behaviour towards algae' changed similarly between all type of analogy learning within the control and analogy conditions.

4. Conclusion and Discussion

4.1 Main results

The aim of the research was to investigate how consumer knowledge of algae can be expanded to stimulate consumers to consider algae as alternatives to conventional food. For this purpose the analogy learning theory was applied. It helped to broaden consumer knowledge of algae by linking it to knowledge of conventional food. Moreover, the outcome of analogy learning stimulated participants to consider algae as alternatives to several conventional food products.

However, it has been found that presence of a base product in the description does not critically influence a degree of schema overlap between a base and a target. The product features play the main role in this process. The importance of abstract qualities and physical properties can vary depend on a product. In other words, the hypotheses that one type of analogy learning will always create a minimal, moderate or considerable schema overlap has not found a strong support.

Relational similarity, which is based on abstract qualities, worked best for the analogy drawing between algae and spinach, while surface similarity was not so effective. The participants have probably considered that physical resemblance (e.g. green colour) does not provide any useful information that can make algae and spinach really close to each other. In contrast, abstract qualities highlight more specific and valuable information that spinach and algae can be used in the same dishes, which makes them stronger linked to each other. This aligns with research, stating that abstract qualities are more important and informative than physical attributes (Roehm & Sternthal, 2001; Gregan-Paxton & John, 1997; Gentner, 1993). Concerning the results of literal similarity, it was neither more or less effective compared to other types.

For potato chips all types of analogy learning created a minimal overlap with algae, so it was hard for the participants to accept their resemblance. Nevertheless, literal and surface similarity created a more compressive schema overlap than relational similarity. There can be several reasons for that. Algae and potato chips can be more distinctive and mentally distant than algae and spinach. Therefore, during analogy learning more attention can be paid to physical properties, because they easily accessible and more prominent than abstract qualities according to Clement et al. (1994). In this case, the physical properties are the useful cues that make algae and potato chips closer to each other. Another reason may be that potato chips are hedonic products, so the physical properties are a very important part of a product image. Subsequently, a match between physical properties can outbalance a value of abstract qualities.

Concerning Hypothesis 2 that affect is transferred from a base to a target via the shared schema, it has not been supported by the research findings. However, it does not mean that a schema is definitely unrelated to transfer, since it may preform another function in this process. Furthermore, it has been found that analogy still plays role in a transfer, stimulating participants to communicate affect from a base to a target. Hypothesis 3, which states that affect towards algae increases with expanding schema overlap, has not been confirmed. The outcome was almost identical in all six conditions. Overall, analogy learning contributes in a transfer of affect, but a degree of affect change is the same between all types of analogy learning.

The most promising results were found for Hypothesis 4. The outcome has confirmed that analogy can stimulate people to perceive products as alternatives. However, it should be taken into account that provision of only features of a product is similarly effective approach, because the results have been positive for the control conditions as well. Regarding the extra test that checked whether this effect would be different between the types of analogy learning, contradictive results were gained. For spinach, relational and literal similarity performed best. People evaluated spinach and algae as moderately comparable alternatives. For potato chips, neither of the types of analogy learning worked better or worse. The participants considered algae and potato chips as slightly incomparable alternatives. In general, these outcomes comport with the results of the schema overlap test, since similarity of spinach and algae have been evaluated as strong, while potato chips and algae have been considered as slightly resemble.

The results of the test that checked a predictive value of the 'Consideration as alternative' towards the 'Buying behaviour towards algae', received a support. 'Consideration as alternative' can explain at least 20-25 % of variance in the 'Buying behaviour towards algae'. As for the difference between types of analogy learning, the effect was stronger for relational similarity compare to surface similarity. In other words, the participants of surface similarity conditions were willing to buy algae rarely, while people from relational similarity conditions were willing to buy it occasionally. The outcome of literal similarity was somewhere in between. These findings confirmed once again that abstract qualities can be considered as more important. However, such trend can be also observed due to the 'Consideration as alternative to spinach' has mainly contributed into the predictive value of the model. Thus, the better performance of relational similarity can be caused by the importance of abstract qualities for the spinach product image.

4.2 Limitations of the study

One of the limitations of the study is a sample that has been formed of only students of Wageningen University. The generalizability of the research findings can be limited, because this sample may differ from a general European population in knowledge of algae. Students of Wageningen University may know more about algae and their features, since information about algae and related experiments are often covered in university news. The extensive knowledge of algae may partly eliminate a controlled difference between conditions, where abstract qualities and physical properties have been used separately. Subsequently, a gap between effectiveness of surface, relational and literal similarity may be bigger in case of general population.

Another limitation of the study was a probable difference between participants. While testing Hypothesis 3, it was found that either participants from the surface similarity

conditions or literal similarity conditions were initially more positive/negative about algae. In order to get some insights, their answers about knowledge of algae were checked. However, there was no a considerable difference in answers compared to other groups.
The last limitation concerns the selected products. Spinach and potato chips have helped to gain the useful insights, but they may not be the best bases for analogy drawing, since they have been selected from a limited list of products. Therefore, a more comprehensive pre-research is needed to determine other options. Furthermore, the product features generated for every product might differ in relevance and credibility. This may sheds a light on why spinach has reached better results than potato chips. Thus, the relative equivalences of features and scenarios should be controlled in future studies. Lastly, presenting participants two products instead of one had positive and negative consequences. In spite of an order randomization, presence of one product could probably influence answer towards another product. On the other hand, showing two products to the same participant helped to test whether both products would be evaluated identically according to the given type of analogy learning. The study revealed that they did not. Therefore, it opens a new direction for research, where a difference between presenting one or several products can be studied.

4.3 Theoretical implications and suggestions for further research

This study has determined that a degree of similarity between a base product and a target product does not change in the same manner, when one or another type of analogy learning is applied. The effectiveness of surface, relational and literal similarity approaches may depend on the facts what features are critical for product image and whether these features useful for comparison. Thus, further research is needed on this topic to better understand relationships and mechanisms that determine an outcome.

The research showed that there was no evidence for the assumption that affect was transferred via the shared schema. An additional study can be carried out to test this assumption by applying other measurement techniques that is more sensitive to the influence of a schema. Also, it has been found that analogy contributes in transfer of affect. Hence, it can be investigated what hidden mechanism is activated by analogy and leads to a transfer of affect.

Another contribution of the current research is a finding that products can be considered as alternatives even when a base product has not been named during analogy learning. Further research is needed to investigate the difference between naming and non-naming a base product.

4.4 Practical implications

The research findings suggest that analogy can be a useful tool for presenting algae as alternative to conventional products, because it helps to highlight similarity between products and extend consumer knowledge of algae beyond stereotypes.

When an analogy drawing is planned between algae and other products, a sophisticated pre-research should be carried out about these products. It has to be determined what product features consumers value the most. After that a suitable type of analogy learning can be selected based on these findings. However, this advice should be treated with care, since a further research is needed on this topic.

Regarding the buying behaviour towards algae, it can be predicted from the 'Consideration as alternatives'. Thought, this factor cannot be solely used for this purpose, since it gives only partial prediction. Therefore, if two products are considered as alternatives, it is not guaranteed a frequent purchase.

Despite the aforementioned shortcomings, an application of analogy can positively contribute in a process of presenting algae as conventional foods.

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Appendix 1 – Questionnaire

Block 1– General introduction

Dear participant,

Thank you for finding time to participate in the current study. This questionnaire is designed as a part of my Master's Thesis research that is aimed to investigate people's opinion about algae. By filling out this questionnaire, you get a chance to win a voucher with € 10 worth. It takes approximately 10 minutes to complete this questionnaire. You are not obliged, but kindly asked to fill in this questionnaire at full. The questionnaire is anonymous and confidential. All collected data will be used only for the research purpose.

Block 2 – Introduction about algae

Please read the text below.

Algae are simple organisms, growing in salt and fresh water. Algae include a great variety of edible species, which are ranging in shape, size, texture, taste and colour. Algae have been known as human food for hundreds of years and consumed in raw, cooked or dried form.

Block 3 – The first measurement of 'Affect towards algae'

Before you start please read this instruction:

You will be asked to indicate your feelings about eating a particular product. We are interested in your first response, so please interpret the words spontaneously even if they may sound a bit weird.

Please select an option that best represents your feeling.

Overall, the thought of eating algae makes me feel…

disgusted 1 2 3 4 5 6 7 acceptance

unsatisfied 1 2 3 4 5 6 7 satisfied

sad 1 2 3 4 5 6 7 delighted

bored 1 2 3 4 5 6 7 excited

tense 1 2 3 4 5 6 7 calm

Block 4 – Stimuli

The texts below describe two types of algae that are differently processed. Please read these texts carefully.[1]

Product 1 – Spinach

Analogy conditions

Condition 1: Algae are like spinach, because they are green and fresh. Similar to spinach they have a soft texture and a smooth surface.

Condition 3: Algae are like spinach, because they can complement numerous dishes. Similar to spinach, algae can be blended into omelette or pie. Algae can be added to salads and sandwiches like spinach. Moreover, algae can be used to decorate dishes similar to spinach.

Condition 5: Algae are like spinach, because they are green and fresh. Similar to spinach they have a soft texture and a smooth surface. Algae can complement numerous dishes as spinach does. Algae can be blended into omelette or pie similar to spinach. Likewise, algae can be added to salads and sandwiches like spinach. Also, algae can be used to decorate dishes similar to spinach.

[1] Overall, two texts were presented to every participant. For example, if a participant was allocated to the condition 3, he or she saw the texts corresponding this condition only.

Control conditions

Condition 2: Algae are green and fresh. Algae have a soft texture and a smooth surface.

Condition 4: Algae can complement numerous dishes. Algae can be blended into omelette or pie. Likewise, algae can be added to salads and sandwiches. Also, algae can be used to decorate dishes.

Condition 6: Algae are green and fresh. They have a soft texture and a smooth surface. Moreover, algae can complement numerous dishes. Algae can be blended into omelette or pie. Likewise, algae can be added to salads and sandwiches. Also, algae can be used to decorate dishes.

Product 2 – Potato chips

Analogy conditions

Condition 1: Algae are like potato chips, because they are dry, salty and crunchy. Likewise, algae can be in different colours and have a wavy surface similar to potato chips.

Condition 3: Algae are like potato chips, since they can be consumed between meals due to the short satiety effect comparable to potato chips. Moreover, algae can be served as bar snacks similar to potato chips.

Condition 5: Algae are like potato chips, because they are dry, salty and crunchy. Likewise, they can be in different colours and have a wavy surface similar to potato chips. Algae can be consumed between meals, since they have short satiety effect comparable to potato chips. Moreover, algae can be served as bar snacks similar to potato chips.

Control conditions

Condition 2: Algae are dry, salty and crunchy. Likewise, they can be in different colours and have a wavy surface.

Condition 4: Algae are can be consumed between meals due to the short satiety effect. Also, algae can be served as bar snacks.

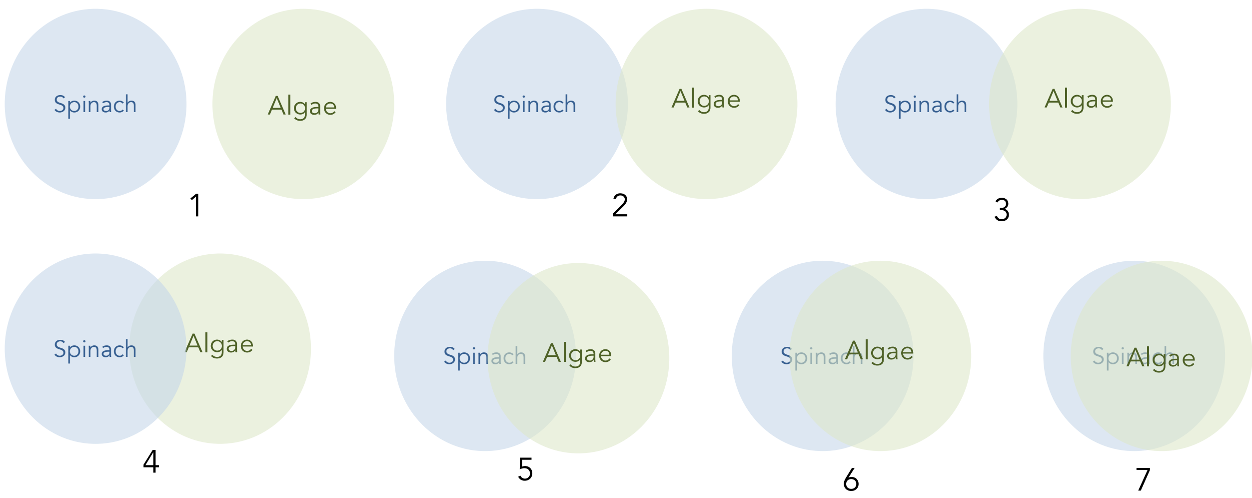
Condition 6: Algae are dry, salty and crunchy. Likewise, they can be in different colours and have a wavy surface. Algae can be consumed between meals, since they have short satiety effect. Moreover, algae can be served as party or bar snacks.

Block 5 – Measurement of 'Schema overlap'

Before you start please read this instruction:

The pictures below represent the degree of similarity between algae and other product. The picture labelled '1' means 'no similarity' between algae and other product, while the picture labelled '7' means 'almost complete similarity'. For example, if you think that the products are almost the same you can choose picture 7.

Please indicate the picture that suits your opinion best. You can select only 1 picture. If you make a mistake, you can deselect the chosen picture by clicking it again.[2]



[2] The same text and picture was resented for potato chips. The blue circle included 'Potato chips' in this case.

Block 6 – The second measurement of 'Affect towards algae'

Please select an option that best represents your feeling.

Overall, the thought of eating algae makes me feel…

disgusted 1 2 3 4 5 6 7 acceptance

unsatisfied 1 2 3 4 5 6 7 satisfied

sad 1 2 3 4 5 6 7 delighted

bored 1 2 3 4 5 6 7 excited

tense 1 2 3 4 5 6 7 calm

Block 7 – Measurement of 'Consideration as alternatives'.

For the following statements please indicate an option that best suits your opinion.

Algae can be the alternative to spinach[3].

- o Strongly disagree
- o Mostly disagree
- o Slightly disagree
- o Neither agree or disagree
- o Slightly agree
- o Mostly agree
- o Strongly agree

Block 8 – Measurement of 'Buying behaviour towards algae'

For the following statements please indicate an option that best suits your opinion.

I would be willing to buy algae…

- o Never
- o Rarely
- o Occasionally
- o Often
- o Very often

[3] The following text was presented for every product.

Block 9 – Measurement of 'Affect towards products'

*The following questions are about **spinach**. Please select an option that best represents your feeling.* [4]

Overall, the thought of eating spinach makes me feel…

disgusted 1 2 3 4 56 7 acceptance

unsatisfied 1 2 3 4 56 7 satisfied

sad 1 2 3 4 56 7 delighted

bored 1 2 3 4 56 7 excited

tense 1 2 3 4 56 7 calm

Block 10 – Extra questions about algae

Please answer the questions below.

Have you heard about algae before?

- Yes
- No

Have you ever consumed algae?

- Yes
- No

How often do you consume algae?

- Never
- Rarely
- Occasionally
- Often
- Very often

[4] The following text was presented for every product.

Block 11 – Demographic data

Please fill in the following fields.

Your age

Your gender

Your country of origin

Block 12 – Gratification

If you would like to get a voucher please leave your email below.

The winners will be contacted in the first half of February.
If you have any questions about the study, you can contact me by sending an email to: margarita.lukshina@wur.nl

Block 13 – Closing paragraph

We thank you for your time spent taking this survey. Your response has been recorded.