

# DOES THE NUMBER OF INGREDIENTS DEPICTED ON FOOD PACKAGING IMPACT INFORMATION PROCESSING, MENTAL TASTE IMAGERY AND PRODUCT CHOICE?

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# L'IMPACT DU NOMBRE D'INGREDIENTS SUR LE TRAITEMENT DE L'INFORMATION, L'IMAGERIE MENTALE DE LA SAVEUR ET LE CHOIX DU PRODUIT

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## Résumé
Dans un contexte fortement concurrentiel des produits alimentaires en supermarchés, les consommateurs ont des difficultés à traiter en profondeur les informations mentionnées sur un packaging. Cette recherche examine comment le nombre d'ingrédients représentés sur les packagings a une incidence sur l'évaluation du produit, en fonction de la capacité des consommateurs à traiter l'information. Une première étude révèle que, sous forte charge cognitive, les packagings illustrés avec plusieurs ingrédients induisent plus d'imagerie mentale de la saveur, favorisant une augmentation de l'intention d'achat. Dans une deuxième étude, il est montré que les consommateurs ayant un besoin de cognition fort et sous forte charge cognitive, le packaging sans ingrédients illustrés, est préféré lorsque les consommateurs sont motivés par la faim. En l'absence de charge cognitive, l'information est traitée centralement et l'évaluation ne dépend pas du nombre d'ingrédients représentés sur le packaging.
***Mots-clés:*** charge cognitive; évaluation; Ingrédients; produit alimentaire; Besoin de cognition; packaging

# DOES THE NUMBER OF INGREDIENTS DEPICTED ON FOOD PACKAGING IMPACT INFORMATION PROCESSING, MENTAL TASTE IMAGERY AND PRODUCT CHOICE?

## Abstract
In the highly competitive context of food product sales in supermarkets, consumers have difficulty processing information on a given package deeply. This research examines how the number of ingredients depicted on packaging impacts product evaluation, depending on consumers' ability to process information. One study find that, under high cognitive load, packages depicting many ingredients induce more mental taste imagery, heighten purchase intent. In another study, for consumers with high need for cognition under high cognitive load, packaging not depicting ingredients is preferred when consumers are motivated by hunger. Without cognitive load, information is processed centrally and evaluation does not depend on the number of ingredients depicted on packaging.
***Keywords:*** cognitive load; evaluation; ingredients; food product; need for cognition; packaging

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## Introduction

Adding a product picture on packaging when products cannot be seen directly is a classic managerial application; it has a proven positive effect on judgment (Underwood & Klein, 2002). Visual or textual cues on packaging facing are used to present arguments on intrinsic product features. For instance, Pillsbury's© 'simply' chocolate chip cookie packaging depicts five ingredients included in the recipe on the facing. The presence of a product picture on packaging facing develops mental imagery and intrinsic sensory properties of products (Paivio, 1986; Hirschman, 1986; Babin & Burns, 1998, Gavard-Perret, 1997; Gallen, 2005). Adding visual cues on the packaging also increases information to process (Winkielman, Schwarz, Fazendeiro, & Reber, 2003), consumers evaluate products using a heuristics strategy during product evaluation (Chaiken, Liberman, & Eagly, 1989). At the opposite, given the purchase context of food products, increasing information may be a counter-productive strategy. A shopper must choose in 25 seconds from among thousands of references (Chandon, Hutchinson, & Young, 2002). Shoppers are thus under heavy cognitive load and this can affect decisions made by shoppers (Malhotra, 1984). In this context, it is harder for them to process the messages presented (Iyengar & Lepper, 2000), leading to failure to memorise and process information (Shiv & Fedorikhin, 1999). The more (versus the less) consumers are involved and can process messages, the more they take the central (versus peripheral) route to evaluate the promoted product (Cacioppo, Petty, Kao and Rodriguez, 1986). Consequently, consumers' ability to process several pictures depicted on a package should depends on whether they experience information overload. It also depends on their capacity to enjoy mobilising cognitive effort to process messages through the need for cognition (Cacioppo & Petty, 1982). The present research investigates the efficiency of adding many ingredient pictures on a food product package according to consumers' ability to process information. This ability depends on both the context (cognitive load) and the consumers' characteristics (need for cognition). Two experimental studies shows the positive impact of the number of ingredients depicted on food packaging facing on intrinsic product perception, purchase intent and preference for the packaging is investigated in a high cognitive load condition.

## 1. Processing packaging information

### *1.1 Processing information*

Information processing depends on the number of elements included in the message conveyed by a package. Most often, whatever the kind of information, seven elements (plus or minus 2) are processed simultaneously in the short term (Miller, 1956). Beyond this limit, the information processing task becomes too complex: the higher the quantity of information, the less the message is understood and perceived by consumers (Winkielman et al., 2003). Similarly, the more (*versus* less) consumers are involved and motivated, the more they process advertising messages via the central route (*versus* peripheral, which entails concentrating on elements such as typography, illustration colours, etc...) (Cacioppo et al., 1986). In the Elaboration Likelihood Model (Cacioppo et al, 1986), involvement depends on the motivation, ability and opportunity to process the message. When consumers' involvement is high, they implement the central route, or the persuasion route, mobilising previous knowledge related to the advertising message. Along

this route, the process generates thoughts and arguments in line with the presented elements. Consumers can thus integrate and retain information. When consumer involvement is low, information is processed via the peripheral route. The peripheral route helps consumer create beliefs about the product regarding secondary superficial and peripheral elements more than on arguments and product benefits presented in the message. This information processing strategy consumes fewer cognitive resources; it is used by consumers who are less motivated to process information or who have fewer cognitive resources available. Consumers then create cognitive heuristics, facilitated by familiar information or information that contains few cues (Chaiken et al., 1989). This simplifies and accelerates the decision process. Central and peripheral routes are related to the matching resources theory based on advertising message persuasion and supplement the ELM model. These two constructs highlight available and required resources. Available resources correspond to individuals' mental capacities to process the advertising message. Required resources reflect necessary abilities to adequately process the message (Anand & Sternthal, 1989). Based on the ELM model and matching resources theory, consumers who are able to process information should process food packaging via a central route and be convinced by the arguments more than the pictures presented. On the contrary, consumers who are not able to process information should adopt the peripheral route and be more convinced by peripheral cues such as pictures conveyed by the package.

### *1.2 Cognitive load*

Cognitive load induces an overload in working memory and leads to failure to memorise and process information (Shiv & Fedorikhin, 1999) and then, can affect decisions made by consumers (Malhotra, 1984). The effect of cognitive load on information processing varies with message fluency. Studies of fluency show that message simplicity makes cognitive processing easier and enhances positive evaluation (Novemsky, Dhar, Schwarz, & Simonson, 2007). The consumers react to an overload of information by becoming more incited, bringing to a reduction of the attention concerned an aspect limited by the incoming information (Kahneman, 1973). As information can't be process in depth, a high cognitive load should thus encourage consumers to use a peripheral route to process information, and then favour a message that includes numerous coherent images.

### *1.3 Need for cognition (NFC)*

As mentioned, the route consumers use to process a message partly depends on their ability; message processing can be observed through the NFC. Cacioppo and Petty (1982) define the NFC as a stable interindividual difference, like a tendency to enjoy cognitively challenging activities. The measure of NFC is strongly correlated with intrinsic motivation. Individuals low in NFC are more influenced by peripheral distractors and tend to process information peripherally. They use cognitive heuristics to form an opinion. Individuals high in NFC do not mind making efforts to process information. They stay focused on a processing activity that requires significant cognitive efforts and are less distracted by peripheral elements. They process information more deeply (Cacioppo & Petty, 1982). They are more likely to form impressions or change their attitude about the central elements of an argument rather than the peripheral elements (Cacioppo et al, 1986).To summarise, without cognitive load, high NFC individuals should appreciate getting ample information about the product they are considering. Conversely, under high cognitive load, high NFC individuals are uncomfortable processing ample information, and

consequently prefer to see little information on the package, which lets them control their cognitive process via the central route.

## 2. Packaging visual cues and consumers' beliefs

Packaging as a silent salesman is a rich advertising medium to convey intrinsic and extrinsic product attributes. The number of elements and the level of similarity between the elements on facing determine the level of complexity (Pieters, Wedel & Batra, 2010; Berlyne, 1970). The more (versus less) the message contains distinct elements, the more (less) complex it is. This determines the difficulty of message processing. In this research, it is considered the number of ingredients depicted visually on a package. Because information processing is hierarchical, visual information is more fixed, better memorised than textual information (Piqueras-Fiszman et al., 2013) and processed faster (Hirschman, 1986).They are more vivid and able to attract attention (Mitchell, 1986; Paivio & Csapo, 1973). Including a product image or graphical representations yields benefits regarding consumer attitudes and beliefs about a product (Underwood, Klein, & Burke, 2001; Underwood & Klein, 2002; Bone & France, 2001). Product pictures elicit imagery processing (Pavio, 1986; Babin & Burns, 1998; Gavard-Perret, 1997; Gallen, 2005), multisensory imageries (e.g., taste, Hirschmam, 1986) and communicate information on intrinsic product and sensory characteristics (Pantin-Sohier & Miltgen, 2012). The more consumers pay attention to iconographic elements, the more they form product judgments (Underwood & Klein, 2002). Ingredients depicted on packaging facing induce a representation of the naturalness of the product (Rozin, 2005), which conveys healthiness in the product composition owing to the familiarity of natural ingredients and linked to tasty product (Werle, Trendel & Ardito, 2013). Also, ingredients depicted increase perceived pleasantness (Lancelot Miltgen, Pantin-Sohier, & Grohmann, 2016).To summarise, the literature highlights that visual cues on packaging might elicit representations of sensory information such as taste, along with increased judgment on product evaluation, depending on consumers' ability to process the packaging, level of cognitive resources and need for cognition. Hence the following hypotheses: ***H1: The number of ingredients depicted on packaging impacts the purchase intent via increasing of perceived mental taste imagery and***

***H1a : In presence of cognitive load, perceived mental taste imagery increases when packaging is with many ingredients***

***H1b : In absence of cognitive load, perceived mental taste imagery doesn't depend on the number of ingredients depicted on packaging***

To better capture those effects, consumers under high cognitive load are investigated, introducing the potentially counter-balancing effect of motivation to process. For food products, to create motivation to process information centrally is to consider hungry consumers. First, they find the presentation of a food product more attractive (Lewin, 1938). Then, hunger impacts strategic decision-making especially in the case of task-solving with cognitive effort (De Ridder,, Kroese, Adriaanse, & Evers, 2014) as with a cognitive load. ***H2: Under high cognitive load, packaging with no ingredients is preferred more (versus less) to packaging with many ingredients by hungry consumers with high (versus low) NFC .***

## 3. Study 1: Ingredient number impact on mental taste imagery and purchase intent

*3.1 Methodology*

A 2 (number of ingredients depicted on the package: few vs many) x 2 (low vs high cognitive load) between-subject experiment was conducted. To manipulate the number of ingredients depicted on the packaging, four stimuli of a chocolate-nut brownie package branded with an unknown name were created and pre-tested (sample of 145 respondents). Subjects were grouped into two levels of information illustrated on the facing: few ingredients (0 and1) versus many ingredients (3 and 5).Natural ingredients (nuts, chocolate, eggs, butter and flour), pretested before the experiment, were perceived positively and belonged to the component list illustrated. Packaging also contained a traditional product picture for the category.

*Measures.* Explained variables are assessed via seven-point measurement scales: perceived mental taste imagery (Adapted from Miller, Hadjimarcou, & Miciak, 2000; α= .90), purchase intent (Bearden, Lichenstein & Teel, 1984; α= .94). Level of perceived naturalness of the ingredients: by asking respondents to choose from among a list of 20 ingredients, 50% of which were natural, those they thought the product contained. The difference between natural and artificial ingredients selected is calculated to produce a score. Perceived healthiness (1 item in 7-point Likert: '*This product is healthy'*), perceived naturalness (adapted from Rozin, 2005), simplicity perception (Cox & Cox, 2002), brownie appreciation and brand name awareness were controlled. The questionnaire ends with questions about gender and age.

*Procedure and participants.* A sample of 217 students (63% women, average age 22.5, *SD* = 5.75) was tested in laboratory. Data were collected for two weeks. Participants were informed that there was a project on a new product launch and that they could enter a drawing (for a digital tablet) as an incentive. For the cognitive load condition, each participant was asked to memorise a 6-digit and to restore at the end of the experiment. Then, one of the four packaging pictures was presented on a digital tablet for 25 seconds and the respondent was asked to complete a paper questionnaire.

### *3.2 Results study 1*

*Results.* After checking the measuring validity, hypotheses were sequentially tested via SPSS software with linear regressions as recommended by Hayes (2015) with model 8 (table 1). Perceived healthiness, naturalness and natural/artificial estimated ingredients difference were integrated as co variable for mental taste imagery and purchase intent.

**Annex 1 Results of study 1**

**x**:Few (coded 0) vs many ingredients (1)-**y**:Purchase Intent
**w**: Low (coded 0) versus high (1) cognitive load
**m**: Perceived mental taste imagery

**Cov1**: Healthiness perceived
**Cov2**: Level of naturalness of the ingredients
**Cov3**: Perceived naturalness

| | **(m)** | | | | **(y)** | | | |
|---|---|---|---|---|---|---|---|---|
| | coeff | *p* | *t* | 90% CI | coeff | *p* | *t* | 90% CI |
| **(x)** | -.70 | .1522 | -1.4371 | -1.5072; .1049 | .35 | .5605 | .5831 | -.6498; 1.3585 |
| **(w)** | -.36 | .1175 | -1.5716 | -.7473; .0187 | .21 | .4533 | .7514 | -.2604; .6947 |
| **(x)X (w)** | .62 | .0470 ** | 1.9976 | .1087; 1.1488 | | | | |
| **(m)** | | | | | .20 | .0160 ** | 2.4279 | .0664; .3490 |
| **(x)X (w)_2** | | | | | -.23 | .5449 | -.6063 | -.8896; .4119 |
| **(Cov1)** | .14 | .0118 ** | 2.5404 | .0504 ; .2377 | .25 | .0004 *** | 3.6168 | .1402; .3759 |
| **(Cov2)** | .09 | .0526 ** | 1.9491 | .0137; .1666 | .17 | .0029 *** | 3.0101 | .0786; .2156 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **(Cov3)** | .08 | .2185 | 1.2343 | -.0271; .1872 | -.05 | .5074 * | -.6640 | -.1869; .0797 |
| **(m)** | | | | | .20 | .0160 ** | 2.4279 | .0664; .3490 |

* p < .10 ; ** p < .05; *** p < .01

Results indicate a positive and non-significant effect of (x) on (y) ($p$ >.10). Also it indicates a negative and non-significant effect of (x) on (m) ( $p$ >.10). Perceived mental taste imagery does not differ according to the number of ingredients depicted ($M_{manyingredients}$ = 5.27, $SD$ = 1.45; $M_{fewingredients}$ = 5.36, $SD$ = 1.21). (m) and (y) are correlated to the perceived healthiness of the product ($p$ < .05 ; $p$ < .01) and to the level of naturalness of the ingredients in the product recipe ($p$ =.05 ; $p$ < .01), however they are not correlated to the perceived naturalness ($p$ > .10 ; $p$ > .10). When consumers are under high cognitive load, results indicate a positive and significant interaction term between (x) and (w) on (m) ($p$ < .05); packaging depicting many ingredients increases perceived mental taste imagery of the product under high cognitive load. And then, (m) has a positive and significant effect on (y) ($p$ < .05). Results indicate a negative and non-significant interaction term between (x) and (w) on (y) ($p$ >.10). The indirect effect of (x) on (y) through (m) moderated by (w) is positive and significant, 0 is not included ($\beta$ = .11; 90% CI = .0403 to .2305), indicating a total moderated mediation (Zhao et al 2010). Packaging depicting many (vs few) ingredients increases purchase intent, under high cognitive load, via the increasing of mental taste imagery. **H1 is then validated.**

## 4. Study 2: Ingredient number impact on product choice according to hungry consumers' need for cognition

As in study 1, cognitive load is manipulated and the focus is on the case of high cognitive load condition. Moreover, consumers' NFC is integrated to investigate the role of consumers' ability to moderate the relationship between the number of depicted ingredients and packaging preference.

### *4.1 Methodology*

The same product and cognitive load manipulation as in study 1 were used. A 2* between subject (low vs high cognitive load) *1 (choice between two packages) experiment is conducted. To contrast the results and base them on the dichotomisation of the NFC (low vs high), two packages with major variance in visual signals represented (via number of ingredients depicted) were compared. A *Bonferroni* test showed that packaging with no ingredients is less hard to understand ( measure of scale of Pieters et al, 2010; α =.86) ($M_{noingredients}$ = 1.76, $SD$ = .99; $M_{5ingredients}$ = 2.42, $SD$ = 1.59; $p$ < .05) than a package with five ingredients.

*Measures.* NFC (Cacioppo & Petty, 1992; α =.75) and level of hunger were measured and the sample was divided into high and low groups based on median split on NFC scores (median = 4.5; $SD$ =.64) and Level of hunger scores (median = 4; $SD$ = 1.87). Gender, age and brand name knowledge were also controlled.

*Procedure and participants.* A sample of 122 students was used and surveyed in laboratory. Data were collected for one week. 50 % of consumers reporting being very hungry; they were retained for the study. The final sample was composed of 52% females, mean age = 21 years, $SD$ = 1.13.

*4.2Results study 2*

An exploratory analysis via logistic regression was computed with choice between a package with no ingredients depicted (coded 0) and one with 5 ingredients depicted (coded 1) as the dependent variable. Covariables are: low NFC (coded 0) and high NFC (coded 1) ; low cognitive load (coded 0) and high cognitive load (coded 1). Results show a direct effect of cognitive load *(*$\beta$ = -2.614, *Wald* $x^2(1) = 5.198$, $p < .05$). In the presence of cognitive load and high NFC, participants preferred packaging without ingredients. 29% of participants chose packaging without ingredients depicted, while 16% of participants chose packaging with 5 ingredients depicted, **H2 is thus affirmed**. Results also show that there is a difference in choice between participants in low or high cognitive load conditions ($\beta = 2.83$, *Wald* $x^2(1) = 7.467$, $p < .01$). 29% of the participants chose packaging with 5 ingredients, while 21% chose packaging without ingredients under cognitive load. Those results are in line with study 1.

**5. Discussion and conclusion**

Results show in study 1 that, under high cognitive load, a package depicting many ingredients induces more mental taste imagery and a better purchase intent. Multisensory imagery induced product taste judgment through peripheral message processing and then purchase intent. Processing is then peripheral due to message processing overload. Mental imagery is based on visual cues, beliefs and judgment. Because the supermarket context induces high cognitive load, it is advisable to use packaging with many ingredients, which increases purchase intent. These results confirm the positive impact of using images when information is processed peripherally: ingredient pictures are used as signals for increasing mental taste imagery (Underwood & Klein, 2002). Anymore, the storage of information increases when the message contains coherent images (Heckler & Childers,1992).As expected, in a context of motivation (study 2) and high cognitive load, packaging is processed via a peripheral route due to the lack of cognitive resources, inducing a preference for packaging including many ingredients. When considering consumers' NFC, the results emphasise an interaction between high cognitive load and high NFC, which induces a preference for packaging with no ingredients because the participant processes information conveyed by the packaging via a central route, which entails greater cognitive effort. The research is limited, first, the storage of packaging in a competitive environment on store shelves is not considered, and cognitive load is manipulated fictitiously. Second, the sample is represented by students. Third, familiarity with iconic representations for this product category was not considered.

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