



A preliminary study on dual process thinking in marketing education

Winslet T. Y. Chan † , Chi-Hong Leung

Department of Management & Marketing, Faculty of Business, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong.

† ✉ winslet.ty.chan@polyu.edu.hk



Corresponding author

ARTICLE HISTORY:

Received: 23-Mar-2018

Accepted: 25-Apr-2018

Online available: 14-May-2018

ABSTRACT

Dual process thinking is an application of two systems of thinking for problem solving and decision-making. System 1 is a heuristic thinking system that involves intuitive and non-reflective thinking, prior knowledge and beliefs of decision maker. System 2 is an analytic thinking system that requires conscious effort and thought, numerical and logical reasoning. This study aims to investigate how marketing students solve problems with dual process thinking. Traditional Cognitive Reflection Test (CRT) contains three-item for measuring the tendency to override System 1 thinking and to engage in reflective System 2 thinking. While the traditional CRT is confounded with numeracy, which is not applicable to the field of marketing, this study employed traditional CRT with three additional marketing related measurement items to collect data from students who major in marketing for analysis. The analytical results showed that it is necessary to motivate and encourage marketing students to use System 2 thinking to learn different marketing concepts that are highly interrelated with one another and to complete tasks that require higher-order thinking skill. This paper also provides a useful reference for educators to design course assignments that aim to develop critical thinking and problem-solving skills of students.

Keywords:

Dual process thinking,
Cognitive reflection test,
Marketing education

Contribution/ Originality

While traditional Cognitive Reflection Test (CRT) is confined with numeracy, which is not applicable to marketing field, this study employs CRT with three additional measurement items to explore whether marketing students make cognitive errors. Rather than System 1 thinking, results show that System 2 thinking is necessary for marketing students to complete tasks that require higher-order thinking skill. This study provides suggestions on enhancing students' System 2 thinking processes.

DOI: [10.18488/journal.1007/2018.8.5/1007.5.186.194](https://doi.org/10.18488/journal.1007/2018.8.5/1007.5.186.194)

ISSN (P): 2306-983X, ISSN (E): 2224-4425



How to cite: Winslet T.Y. Chan and Chi-Hong Leung (2018). A preliminary study on dual process thinking in marketing education. *Asian Journal of Empirical Research*, 8(5), 186-194.

1. INTRODUCTION

According to Freud (1915), there are two systems of thinking: primary process thinking and secondary process thinking. Specifically, primary process thinking is unconscious, associative and is driven by wish-fulfillment motives, while secondary process thinking is considered as conscious and goal-driven. This Freudian perspective introduced the idea of unconscious thinking and proposed the notion of rationalization. Individuals alternate between the two systems of thinking depends upon their own characteristics and pre-existing framework (Stanovich *et al.*, 2008).

In line with the primary process thinking and second process thinking, dual process theory of thinking in cognitive psychology describes two systems of thinking. System 1 thinking produces the fast, intuitive reactions and instantaneous decision that govern our lives. System 2 thinking involved in focus, deliberation, reasoning or analysis (Stanovich, 1999; Evans, 2010; Stanovich, 2004). In other words, System 1 thinking is fast, unconscious and automatic while independent of context, whereas System 2 thinking is conscious and rational (Croskerry, 2009; Evans, 2010; Kahneman, 2011; Osman, 2004; Stanovich, 2011). The cognitive capability of a person depends on the extent to which one uses each of the two systems. The use of System 1 thinking results in analytic intelligence, whereas the use of System 2 thinking leads to interactional intelligence (Evans and Stanovich, 2013). When one relies more on his or her analytic abilities characterized in System 2 thinking and less on heuristics characterized in System 1 thinking, one has higher cognitive capabilities to solve complicated problems (e.g., calculating mathematics, exercising self-control, or performing a demanding physical task). It is suggested that the application of dual process learning can reduce and avoid mistakes.

On the other hand, it is argued that people have an ability to memorize a wide range of skills acquired in a lifetime of practice for solving problems. New skill can be acquired and developed through practices and obtaining feedback about the rightness of actions and thoughts (Ericsson *et al.*, 1980). Once the new skills have been acquired and developed, the intuitive choices and judgments coming to mind rapidly will be correct mostly (Kahneman, 2011), except the following two situations in which errors are likely to be occurred. First, an error originates from heuristics that a person used in System 1 thinking, but it cannot be corrected by System 2 thinking. Second, an error arises from both System 1 and System 2 thinking, and it can only be corrected by increasing knowledge (Norman *et al.*, 2016).

The differences between System 1 thinking from System 2 thinking were widely studied and well documented in the prior studies (Stanovich, 1999; Stanovich, 2011). The operations of System 1 thinking is generally described as unconscious, rapid, parallel, domain specific and pragmatic in nature. It is believed to be evolved early and shared with various animals. In contrast, the operation of System 2 thinking is conscious, slow, sequential, logical and hypothetical. It is evolved recently and found uniquely in human. System 2 requires working memory resources, and thus it is highly correlated with intelligence. It is also associated with domain general problems and abstract thoughts.

The Cognitive Reflection Test (CRT) is a three-item instrument for measuring if the tendency of a person engage in System 1 thinking or System 2 thinking (Frederick, 2005; Toplak *et al.*, 2011). In other words, CRT is developed and used to assess cognitive style of individual – intuitive or logical. The three measurement items in CRT (Frederick, 2005) are the questions Q1 to Q3 in Appendix A.

Each traditional CRT question is designed to prompt an intuitive yet incorrect answer. In question 1, for instance, the answer 10p might initially come into minds for majority of people even though a simple verification can avoid this wrong answer. This indicates that people tend to make use of System 1 thinking to generate initial and intuitive response. To obtain the correct answer, one requires calculation consciously to reject the wrong answer and get the new answer. In question 2, another example, the common wrong answer is 100 obtained intuitively from a wrong analogous comparison between two sets of figures in two different situations. Similar to question 1, a thoughtful consideration can help to reject this wrong answer. One machine produces one widget in five minutes and, thus, n machines produce n widget in five minute simultaneously. Regarding question 3, the half of the lily

pad size is intuitively processed as the half of the period of time ($48 \text{ days} \times \frac{1}{2} = 24 \text{ days}$). When one reads the question carefully and thinks it logically, the half of the lily pad size is acquired just one day ago. Thus, the answer is 47 days (i.e. $48 - 1 = 47$). Therefore, the CRT measures the tendency to supersede an initial and intuitive answers generated by System 1 thinking and then to use System 2 to think more reflectively to find out the right answers.

The cognitive challenges of the CRT are possibly similar to those confronted by marketing students, who usually respond and think intuitively when they answer questions in the assignments and examinations (Lévesque, 2008). Such intuitive reactions and thoughts are formed from students' non-reflective thinking and experience of the world but these answers reflect misconception from the scientific and logical perspectives. Cognitive processing theory considers knowledge consistent and resistant to change (Nonaka and Toyama, 2003) and misconceptions hindering the learning performance of students.

Therefore, teaching should focus on challenging these misconceptions through conceptual change (Vosniadou, 1994). Knowledge in pieces, another cognitive processing theory, however, holds opposite view on misconceptions. From the perspective of knowledge in pieces, student ideas are viewed as fragmentary, transient, and context dependent (Nonaka and Toyama, 2003). Students' cognition is changeable and it is highly depended upon the context. The resources available to students have a much smaller grain size, e.g., knowledge elements, basic units of intuitive resources gained from experience of the world. Learning plays an important role in developing "patterns of association", which can both help and hinder the individual in solving problems (Shankweiler *et al.*, 1999). Therefore, this study hypothesized that dual processing theory may be another approach for the educators to understand the role of misconceptions in learning marketing, and thus affecting teaching approach adopted by educators.

The study discussed in this paper was motivated by the cognitive challenges of the traditional CRT. The study aims to explore whether marketing students makes cognitive errors. Marketing students usually give intuitive responses when they have to answer marketing questions. These incorrect answers are usually referred as misconceptions that hinders their learning. In addition, a cognitive test for the domain of marketing was designed to predict the marketing students' likelihood of engaging in rational decision and their ability to make unbiased judgments. The purpose of this study was to apply this cognitive test as well as the traditional CRT to investigate the cognitive process of marketing students, and compare the difference between these two tests. Last, but not least, suggestions for motivating and encouraging students to use System 2 for correct decisions are given in this study.

2. RESEARCH METHOD

It is hypothesized that the cognitive processes in answering the traditional CRT are comparable to those in answering marketing questions, particularly those involving misconceptions (e.g., marketing activities and mix). To test this hypothesis, undergraduate students in Department of Marketing were asked to participate in the cognitive test, which contains six questions in total. The first three questions are adopted from traditional CRT, whereas other three marketing concept-related questions are true/false questions (shown as the questions Q4 to Q6 in Appendix A) that are used to test conceptual understanding of students. The intuitive answers and correct answers of the three marketing-related questions are as follows:

- Question 4 mentions the consumer's point of view and it seems to be a proper marketing practice which is good for consumers. Thus, the intuitive answer to the question is true but societal marketing should be concerned about others including those who are not consumers but affected by marketing campaigns of a company.

- Question 5 mentions one marketing mix and it is really a consequence of mass marketing. The answer seems to be true intuitively. However, there is other target strategy (i.e., concentrated strategy) leading to one marketing mix, also.
- Question 6 mentions promotion that is just one element of marketing mix. Intuitively it seems to be true based on the general consumer experience. However, all four elements of marketing mix can affect sales of a product. For example, a low quality product, a high product price and inconvenient distribution channels are also the reasons for a product unable to sell well.

3. ANALYTICAL RESULTS

A total of 122 students studying marketing subjects in a university were invited to be the respondents and answer the six questions in Table 1 and 2. The sample size (n=122) of survey in this study is consistent with studies in similar nature and research method (Frederick, 2005). The first three questions are those in the traditional CRT and other three are related to the domain of marketing. Table 1 shows the percentages of respondents answering these six questions correctly.

Table 1: The percentages of respondents answering the six questions correctly in the survey (N=122)

Three traditional CRT questions				Three marketing questions			
Number of questions answered correctly				Number of questions answered correctly			
0	1	2	3	0	1	2	3
11.5%	27.0%	27.9%	33.6%	3.3%	9.8%	35.2%	51.6%

There were only 33.6% of respondents who answered all the traditional CRT questions correctly, comparable to the results of the traditional CRT performed firstly in the eleven universities (Frederick, 2005). In these universities, the percentages of respondents answering all the three questions correctly ranged from 5% to 48% (Frederick, 2005). The proportion of respondents answering all three marketing questions correctly was 51.6%. Since the three marketing questions were multiple-choice questions, one might attempt to get a correct answer by chance. Therefore, the probability of answering the three marketing questions correctly in a random manner (i.e., $0.5^3 = 0.125 = 12.5%$) should be taken into consideration. The adjusted percentage of three marketing questions answered correctly was $51.6\% - 12.5\% = 39.1\%$, suggesting that it was still higher than the corresponding performance of the traditional CRT questions.

One of the reasons that explains the higher performance of marketing questions is that these marketing questions were relatively more complicated in nature than those in the traditional CRT. The numerical figures in each traditional CRT question made respondents react intuitively, but also incorrectly. Respondents might process these numerical figures based on the similar mathematical formulae they came across before. However, they did not think properly to consider if these formulae were really suitable or not. For instance, to answer question 1, one might intuitively use the formula: *sum – large number = small number*.

However, there was merely textual content without number in each marketing question, and respondents had to read words and digest their semantic meanings to understand the question first. This was cognitive strain involving thoughtful thinking, and more respondents could answer these marketing questions correctly in this situation. A higher performance of the CRT was obtained when the font used in the traditional CRT questions became unclear and illegible (Frederick, 2005) because the bad font is also a kind of cognitive strain that is more likely to trigger System 2 to eliminate intuitive answers.

The linear correlation coefficient between the performance three traditional CRT questions and that of the three marketing questions was 0.256. The result indicated that there was no linear correlation

between them. Respondents with the high performance in the traditional CRT questions might demonstrate various performances in the marketing questions, and vice versa. This finding suggests that the characteristics of marketing questions are different from those of the original CRT questions. The CRT mainly puts emphasis on numeracy (Thomson and Oppenheimer, 2016) and may not be suitable for marketing subjects. This is the reason

Discussion: Suggestions on improving System 2 thinking in marketing education

Based on the analysis results, it is important to provide students with training on the application of System 2 thinking to solve marketing-related problems, especially those misunderstand the marketing concepts. Using the three marketing questions in Figure 2 as examples, the following are some suggestions for educators' consideration in improving the learning performance of marketing students.

First, there are usually many marketing concepts in a hierarchical structure to be learnt by students. Concept mapping can help students to understand these complicated concepts and their relationships (see Figure 1). The following is an example of a concept map showing several related concepts relevant to the Question 4 about societal marketing. This concept map shows that societal marketing considers both society's and consumers' long-term needs and interests, instead of consumers' value only. Practically, students may be asked to construct concept maps to organize what they learnt in classes and make these concepts clearer for the application in the future. In addition, students may use concept maps to communicate with their group members in a collaborative manner for sharing knowledge.

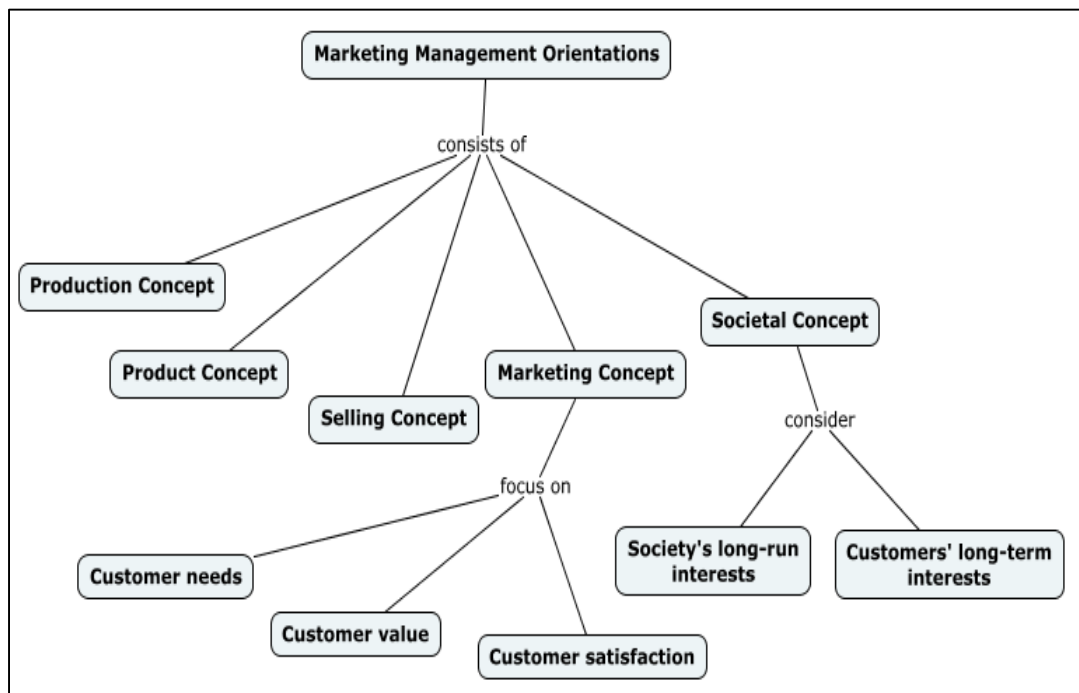


Figure 1: Example of a concept map showing marketing concepts

Second, in addition to the concept maps, other visual aids can be used to demonstrate the relationships among similar concepts. In particular, Venn diagrams can be used to show the identical and different features of two similar concepts (Dooley and Murphrey, 2000). Figure 2 illustrates an example of a Venn diagram. The usage of visual aids for learning and revision helps students to understand the interrelationships among similar concepts that might cause students confusion (Clarke et al., 2006).

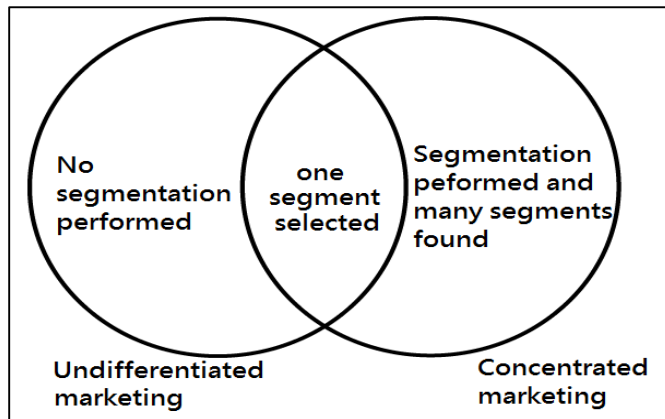


Figure 2: Example of a Venn diagram showing relationship between two concepts

Third, there are many logical operations when students are learning and understanding subject matters of marketing. To answer question 6 correctly, students have to understand the following logic and the inappropriateness of its corresponding reverse logic.

Origin logic: insufficient promotion causes a low sales figure.

Reverse logic: A low sales figure is caused by insufficient promotion.

The reverse logic above is incorrect. If students really cannot understand why it is wrong, similar examples relevant to the daily life may be provided. The followings are examples.

Origin logic: A dog has four legs.

Reverse logic: A thing with four legs is a dog.

Learning logic can be an interesting activity in the classroom. In Figure 3, there is a game for learning the relationship between the number of selected segments and the targeting strategies.

There are four cards. Each has a capital letter representing a particular targeting strategy, including undifferentiated (U), differentiated (D), concentrated (C) and niche (N) strategies. On other side of a card, there is a digit representing the number of segments selected by the corresponding strategy, including 1 and ≥ 2 .

U	N	1	≥ 2
---	---	---	----------

You select only those cards that are necessary to be turned over to find out if the following rule is true or not.

Rule: If there is a U on one side of the card, then there is 1 on the other side of the card.

Figure 3: An example of a logical game showing the relationships between various targeting strategies and the number of segments by them

The correct answer to the game in Figure 5 should be “U” and “ ≥ 2 ” cards. To turn over “U” card to determine whether it is “1”. If it is not “1”, the rule is false. It is not necessary to turn over “N” card because its other side is irrelevant to the rule. It is also not necessary to turn over “1” card because it is possible that another capital letter (e.g. “C”) may lead to the same digit of “1”. Finally, to turn over “ ≥ 2 ” card is necessary to determine whether it is “U”. If it is “U”, the rule is false.

All the suggested examples above motivate students to use System 2 to think critically and make decisions rationally after considerations of all important aspects of marketing issues. They may be

applied in both teaching and learning activities to encourage students to adapt to logical problem solving.

4. CONCLUSION

Cognitive processes can be broadly classified into two types: System 1 and System 2. System 1 processes operate autonomously in response to stimuli in the environment. System 2 thinking is closely related to cognitive capabilities, including mental simulation, complex emotions, rule-based reasoning and logical thinking (Evans and Stanovich, 2013). In daily activities including learning, System 2 thinking enhances conceptual understanding of complex processes, learning via analogy, language processing and numeracy (Evans and Stanovich, 2013; Penn *et al.*, 2008).

A total of 122 marketing students in a university were invited to perform a cognitive test that consisted of the three traditional CRT questions (Frederick, 2005) and three true/false marketing questions. The test results showed that the percentage of the respondents answering all the three CRT questions correctly was 33.6%, compared to the results of the same test in other universities. It was also found that the percentage of the respondents answering all the three marketing questions correctly was 51.6%. The higher cognitive strain of the marketing questions made more respondents use System 2 to think logically. The low linear correlation coefficient ($r=0.256$) between these two types of questions in the test showed the very different natures of them. The original three CRT questions were confounded with numeracy (Thomson and Oppenheimer, 2016) and the three marketing questions appeared to rely less on numeracy. Thus, in the test, respondents with the high CRT performance might be with various performances of the marketing questions and vice versa.

This paper has also discussed several ways of enhancing students' System 2 thinking processes, including concept mapping, the usage of visual aids like Venn's diagram, and the logic application including games relevant to the subject matters. Through conceptual change, teaching and learning activities should focus on channeling these misconceptions and development of association of knowledge pieces that may support students in solving marketing problems.

Funding: This study received no specific financial support.

Competing Interests: The authors declared that they have no conflict of interests.

Contributors/Acknowledgement: All authors participated equally in designing and estimation of current research.

Views and opinions expressed in this study are the views and opinions of the authors, Asian Journal of Empirical Research shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.

References

- Clarke, I., Flaherty, T. B., & Yankey, M. (2006). Teaching the visual learner: The use of visual summaries in marketing education. *Journal of Marketing Education*, 28(3), 218-226. [view at Google scholar](#) / [view at publisher](#)
- Croskerry, P. (2009). Clinical cognition and diagnostic error: Applications of a dual process model of reasoning. *Advances in Health Sciences Education*, 14(1), 27-35. [view at Google scholar](#) / [view at publisher](#)
- Dooley, K. E., & Murphrey, T. P. (2000). *How the perspectives of administrators, faculty and support units impact the rate of distance education adoption*. Retrieved on December 2, 2017 from <https://eric.ed.gov/?id=EJ635408>.
- Ericsson, K. A., Chase, W. G., & Faloon, S. (1980). Acquisition of a memory skill. *Science*, 208(4448), 1181-1182. [view at Google scholar](#)
- Evans, J. S. B. T. (2010). *Thinking twice: Two minds in one brain*. Oxford, England: Oxford University Press. [view at Google scholar](#)
- Evans, J. S. B. T., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science*, 8(3), 223-241. [view at Google scholar](#)

- Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives*, 19(4), 25-42. [view at Google scholar](#)
- Freud, S. (1915). The unconscious. *The standard edition of the complete psychological works of Sigmund Freud*. Volume XIV (1914-1916): On the History of the Psycho-Analytic Movement, Papers on Metapsychology and Other Works, pp.159-215. [view at Google scholar](#)
- Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan/Allen Lane, London. [view at Google scholar](#)
- Lévesque, S. (2008). *Thinking historically: Educating students for the twenty-first century*. Toronto: Buffalo. [view at Google scholar](#) / [view at publisher](#)
- Nonaka, I., & Toyama, R. (2003). The knowledge-creating theory revisited: Knowledge creation as a synthesizing process. *Knowledge Management Research & Practice*, 1(1), 2-10. [view at Google scholar](#) / [view at publisher](#)
- Norman, G. R., Monteiro, S. D., Sherbino, J., Ilgen, J. S., Schmidt, H. G., & Mamede, S. (2016). The causes of errors in clinical reasoning: Cognitive biases, knowledge deficits, and dual process thinking. *Academic Medicine*, 92(1), 23-30. [view at Google scholar](#)
- Osman, M. (2004). An evaluation of dual-process theories of reasoning. *Psychonomic Bulletin and Review*, 11(6), 988-1010. [view at Google scholar](#) / [view at publisher](#)
- Penn, D. C., Holyoak, K. J., & Povinelli, D. J. (2008). Darwin's mistake: Explaining the discontinuity between human and nonhuman minds. *Behavioral and Brain Sciences*, 31(2), 109-130. [view at Google scholar](#) / [view at publisher](#)
- Shankweiler, D., Lundquist, E., Katz, L., Stuebing, K. K., Fletcher, J. M., Brady, S., Fowler, A., Dreyer, L. G., Marchione, K. E., Shaywitz, S. E., & Shaywitz, B. A. (1999). Comprehension and decoding: Patterns of association in children with reading difficulties. *Journal Scientific Studies of Reading*, 3(1), 69-94. [view at Google scholar](#) / [view at publisher](#)
- Stanovich, K. E. (2004). *The robot's rebellion: Finding meaning the age of Darwin*. Chicago, IL: University of Chicago Press. [view at Google scholar](#) / [view at publisher](#)
- Stanovich, K. E. (2011). *Rationality and the reflective mind*. New York, NY: Oxford University Press. [view at Google scholar](#) / [view at publisher](#)
- Stanovich, K. E. (1999). *Who is Rational? Studies of individual differences in reasoning*. Mahweh, N.J.: Lawrence Erlbaum Associates. [view at Google scholar](#)
- Stanovich, K. E., Toplak, M. E., & West, R. F. (2008). The development of rational thought: A taxonomy of heuristics and biases. *Advances in Child Development and Behavior*, 36, 251-285. [view at Google scholar](#) / [view at publisher](#)
- Thomson, K. S., & Oppenheimer, D. M. (2016). Investigating an alternate form of the cognitive reflection test. *Judgment and Decision Making*, 11(1), 99-113. [view at Google scholar](#)
- Toplak, M. E., West, R. F., & Stanovich, K. E. (2011). The cognitive reflection test as a predictor of performance on heuristics-and-biases tasks. *Memory & Cognition*, 39, 1275-1289. [view at Google scholar](#) / [view at publisher](#)
- Vosniadou, S. (1994). Capturing and modeling the process of conceptual change. *Learning and Instruction*, 4(1), 45-69. [view at Google scholar](#) / [view at publisher](#)

Appendix A: Questions used in the experiment

Question	Intuitive answer	Correct answer
Q1: A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?	10p	5p
Q2: If it takes 5 machines 5 min to make 5 widgets, how long would it take 100 machines to make 100 widgets?	100	5
Q3: In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?	24	47
Q4: When a company views and organizes its marketing activities from only the consumer's point of view, it is practicing societal marketing.	True	False
Q5: When there is one marketing mix in the marketing plan, it must be mass marketing (i.e. undifferentiated marketing).	True	False
Q6: When a product cannot sell well, promotion is not sufficient.	True	False