

Priming and Blood Sugar Level Effect on Learner Cognition in EFL Class

Joy JARMAN-WALSH

EFL クラス学習者の認知における Priming と血糖値水準効果

ジャーマンウォルシュ ジョイ

Abstract

Effective education may indeed be more closely related to a learner's mental and physical state before they enter our classroom, than in it. How students are "primed" (thought processes influenced by an effect prior to an event) which influences their mood and overall cognition. As well as effects on the thought process because of a person's normal or low blood glucose level, has been shown to have a strong affect on the subconscious. In this paper, research presented will outline how even cognitive processes which we believe to *think carefully* about, seem controlled by influence on the subconscious. Although this issue seems relevant to teaching in general, it may be especially relevant when teaching young, Japanese female students. This is because, in light of recent trends in Japan, many young women claim to regularly skip meals and almost 30% are considered underweight. As studies will show, this condition which affects glucose levels, may have quite a significant effect on cognition and class success. This paper will discuss the latest research on the topics of priming and blood sugar levels affecting cognition, in order to explore how these two influences may affect university classes for Japanese female students in Japan. Related news stories, data and empirical research studies in the EFL university classroom are also presented.

This paper concludes with a call for further research in the field of priming and glucose levels on cognition for Japanese female students. There is a great deal that can be learned from these studies to help educators prepare and motivate students to do their best- now and in the future.

Priming

Priming is a term that is coined by psychologist who have done research studies on how individuals behave and answer questions due to what happened prior to a test. Most people consider behavior like how fast you walk, or attitudes about race, self-control or plans for the future to be thoughtful processes. But in actuality, these cognitive processes seem to be completely determined by the subconscious, based on the stimulus that is presented before cognition.

Psychologist and winner of the Nobel prize, Daniel Kahneman, states that despite feeling like

we rationally think about and decide how to act in certain situations, studies have found that most of our decisions are made on a completely subconscious level (2011).

Psychologist John Bargh did an experiment with students at New York University where he asked the test group to do an activity matching words which were connected to old age- such as, “forgetful, bald, wrinkle”. The control group were given the same task, but with more general words which lacked a specific theme. He then asked them to walk down a hall to another room. The test group which was “primed” with “elderly” words, walked down the hallway significantly slower than the test group. When he asked this test group about their behavior, they couldn’t remember the words in the first task having any specific theme. These results along with similar studies allowed Bargh to conclude that the actions of the test group were influenced by the primed words, without any conscious thought or awareness occurring (Bargh et al., 1996). In fact, Bargh and his fellow researchers conducted three different experiments on the subject of priming. Below is taken from their abstract:

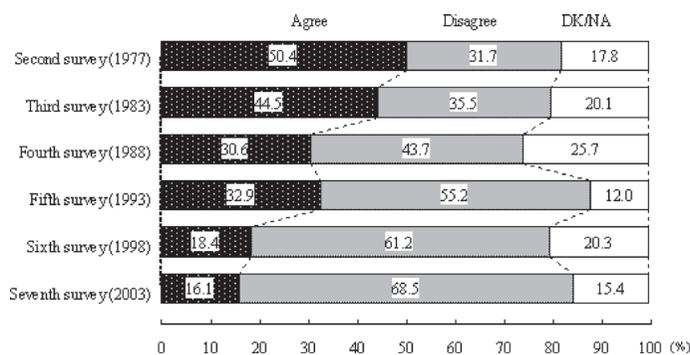
Experiment 1 showed that participants whose concept of rudeness was primed interrupted the experimenter more quickly and frequently than did participants primed with polite-related stimuli. In Experiment 2, participants for whom an elderly stereotype was primed walked more slowly down the hallway when leaving the experiment than did control participants, consistent with the content of that stereotype. In Experiment 3, participants for whom the African American stereotype was primed subliminally reacted with more hostility to a vexatious request of the experimenter. (Bargh et al., 1996:230)

These experiments showed that not only unconscious actions, but also opinions and comments, which most people consider to be carefully thought out, also seem to be strongly influenced by the priming. In fact, psychologists have argued that there may not only be an influence, but for most people, thoughts and actions may indeed be completely controlled by information that is primed (Kahneman et al., 2010).

In another experiment on the negative priming effect of gender stereotypes on female university students, the results are similarly convincing. Rydell and his research team demonstrated that female students who were told of the negative stereotype that “women are not very good at math and visual processing”, were less able to do a subsequent visual or math task. They compared this test group to a control group of female students who were asked to do the same tasks, without being told of the negative gender stereotype (Rydell et al., 2010). They found that the presence of the negative stereotype increased negative thoughts. This in turn, “decreased cognitive resources by increasing the perseverance of incorrect problem-solving strategies.” (p.14042). Rydell’s team’s research may be especially relevant for EFL teaching as they studied how American, English-speaking students perceived Chinese (Kanji) characters. Japanese students are similarly asked to perceive and work with English, which is also outside of their native language’s (Japanese) character system. Whether or not a news program or class discussion, which similarly emphasizes

female weaknesses, would affect how well female Japanese students are able to perform tasks in English calls for further study.

However, despite remaining gender bias in the media (Hashimoto, 2009), some data shows that, according to this official Japanese government's Cabinet office poll, stereotypical opinions about whether "men should work and women stay at home" seem to be shifting (Cabinet, 2010).



(Cabinet, 2010)

Figure 1. The Cabinet Office : Public Opinion Survey On Gender-Equal Society

This change of attitude to working women would help minimize the negative gender priming that might have occurred until the mid 1990's when public opinion seems to shift. However, there are still examples which may be influencing how female students perceive their role in society as leaders and working full-time in their future careers. (Hashimoto, 2009).

One method of combating negative priming may be to present positive female role-models or gender-positive curriculum in the classroom and workplace. Here are two examples of gender-positive materials that have proved suitable for priming Japanese female university students to be more optimistic about future careers. The first example was from a TEDxTokyo conference talk in 2011, given by analyst Kathy Matsui, manager at Goldman Saks Tokyo. She proposes a need for a female exodus to the workplace in Japan to compensate for the shrinking population. Matsui is very vocal about her feminist ideas, submitting her "Womenomics" research to conferences like TED, as well as writing columns on the Goldman Saks website among others. She claims in her talk that research worldwide, as well as within Japan, confirms that working women stereotypes are without merit. In the talk, Matsui presents data which shows that, in areas where there is a higher percentage of women working full-time, there are higher fertility rates. This data debunks the typical stereotype, sometimes promoted in the media stating that if more women work full-time, the number of births will decrease (Matsui, 2011). After watching Matsui's presentation (in English with Japanese subtitles) with a small seminar group class, students were asked to write their answers to the following questions in Figure 2. Although the sample is small, this group wrote much more challenging types of careers down as well as wrote more positively about holding

positions of importance in a future job. In contrast to their answers to the same question the week prior- which was given to them without any priming activity. Perhaps they were simply more familiar with the question, or there could be other factors involved due to positive priming.

1. How do you feel about balancing home and work life?
2. What future careers are you interested in?
3. How would you feel about becoming a managers or holding a position of powre in a future job?
4. How do you feel about balancing family and work life in the future?

Figure 2. : Attitude to future life & Career.

With another class, a group of third-year female university students, they were asked the same questions (Figure 2) without first watching the gender-positive presentation (i.e. no priming). The next week, this class was primed with another presentation (this time in Japanese with English subtitles) by a female Japanese life-coach named Yoshie Komuro. Komuro is a working mother, life-coach, company management consultant. She also describes herself as well as a “work-life-balance advocate”. Komuro spoke at the 2012 TEDxTokyo conference. In her speech she talked about her role as a human resources consultant. She said when she is asked to consult for a struggling company, she advises them not to downsize, as is the normal practice, but instead to maintain the same number of employees. She goes on to explain the benefits of stopping overtime work instead of downsizing a company; as it has been proven that workers are only capable of concentration for up to 13 hours in a day and are more productive if not over-worked. Komuro showed data from successful companies that saved money by hiring more young workers and women who are happy to work for limited hours, cut overtime for all staff and were able to increase overall productivity (Komuro, 2012).

This seminar group also similarly showed more positive and confident answers to the questions (Figure 2) than the week before. In this group, two of the students mentioned wanting to work in international companies in Japan which have these policies in place. And one wrote of wanting to work abroad. Nothing similar was mentioned the week prior, as most of the answers were quite limited and cynical in view of a working future. When asked why their answers were different than the week before, most students said they were influenced by Komuro’s speech whereas a few argued that this is how they have always felt (despite having very different answers the week prior).

Again conclusions are difficult to draw from such a small study, however, these priming speeches did seem at the very least motivating for these female students. If female university students were all primed with this information before job hunting, it may give them more confidence. They may also feel self-assured that their participation is a vital part of the Japanese workforce and there are good options for women who want to balance family and worklife (Matsui, 2011; Komuro, 2012).

As seen above, priming students with positive information can create positive results, but is it also possible to improve a student’s bad mood? According to Kahneman, there is evidence that mimicking smiling or frowning can indeed change a subject’s mood. One simple method of

improving mood is to ask subjects to hold a pen in their teeth for 30 seconds before starting a lesson or presentation. This action forces a smile, and even though it is not a genuine smile, this has been shown to make listeners feel more positive about the information that follows. The opposite apparently also holds true. If you ask people to hold a pen in their lips (forcing a frown) it would create a stronger emotional response to sad pictures or negative information (Kahneman, 2011).

Health and the level of physical comfort also play a part in cognition. In a study by Danziger and his colleagues, criminal Judges were found to give much harsher sentences before lunch and more lenient sentences after lunch (Danziger, Levav & Avnaim-Pesso, 2011). Earlier research by Gaillot and Baumeister (2007) also found that willpower and self-control were linked to physical stability in terms of a body's blood sugar, or glucose levels. Both studies found that someone who is hungry would experience more instances of poor, or less thoughtful, judgment than someone who had sufficient energy (glucose levels).

In another study, self-discipline has been connected to success in academia. Duckworth and Seligman (2005) found that if students considered themselves as being "disciplined", and were also ranked highly by their parents and peers, it was the most accurate predictor of high grades. In fact, being considered "self-disciplined" was an even better predictor of academic success than a high IQ score on a test. Therefore, if making a connection to research linking glucose levels to self-discipline, there is good argument for keeping an eye on nutrition and diet among students.

Wang and Dvorak (2010) found that diminished glucose levels had an effect on how optimistic, or willing to prepare for the future, their subjects were. They found higher incidences of "future discounting" choices made by participants in their study when blood sugar levels were lower. In their study, they offered participants two options: take something mediocre right away, or wait a little while and get something much better. For participants with low blood sugar, they chose what was more immediately available, despite it clearly having less value. Wang & Dvorak (2010) state in their conclusion:

As actually measured in the lab, increasing blood glucose levels via a soft drink containing sugar led to an increase in the value placed on future rewards. In contrast, drinking a soft drink that did not contain sugar led to an increase in the value placed on current rewards. These findings suggest an adaptive mechanism linking human decision making to metabolic cues, indicating environmental scarcity on a micro level. (pp185-6)

Although no specific research on blood sugar levels and cheating in the classroom could be found, teachers may assume that if a subject chooses immediate rewards while disregarding future consequences, this could lead to making bad decisions in class. Blood sugar may have an effect on a pupil's bad decision to behave badly in class- cheating, sleeping or simply not paying attention could all be connected to poor diet or skipping meals.

Not only could bad classroom choices affect behavior, and a learner's grade, but at the

university level, there are many instances important to grades or career preparation which may be compromised if glucose levels are low. Applying for challenging jobs, preparation for qualifications like book-keeping, or tests like the TOEIC exam could be affected if motivation is low. Not to mention, diligently applying to training courses, internships or job interviews. There are also the day-to-day academic study requirements, which may be compromised. Taking time and making effort to research and write papers before a deadline; preparing adequately for a presentation or simply being an active listener in class. These are all essential elements of getting good grades and key components of being a successful university student; which may depend on managing a constant, healthy blood sugar level. This may be a particular concern for Japanese female students (MHLW, 2010).

In Japan, 30% of young female respondents to a government survey have admitted that they skip breakfast (Ministry of Health Labour and Welfare, 2010). If we think of how this may translate to the population of a classroom of female students; there are likely to be a quarter of the students in a class who may have low blood sugar. Based on research on glucose levels, this may add a level of understanding on a student's ability to take on new, challenging, or important information. In terms of scheduling tests and activities, it may be advisable to suggest that students eat something before attending a key class. Advising students against skipping meals might also minimize instances of cheating or breaking other class rules or acceptable decorum. (Wang & Dvorak, 2010)

There is still the question of why this is such a problem for Japanese female students. Shigeta and colleagues (2008), did research with female junior college students in Japan who had a strong desire for "thinness". They concluded that their desire to lose weight was because many of their role-models, such as female celebrities, who they considered "ideal", were in fact underweight. They estimated that popular Japanese female celebrities often have a BMI (Body Mass Index) of 16.5-18. This rate of BMI would be considered underweight by medical standards. In fact, the very serious underweight disease, Anorexia nervosa, is often determined by a doctor if someone's BMI is 17 or lower. The global standard for a "healthy" BMI range is considered to be between 19-24 (Parrish, 2010).

At women's universities in Japan, where a majority of students are in the target age range for being underweight in Japan, instructors may see stronger effects in classroom function due to lower blood sugar levels of students. Students who restrict their caloric intake, or skip meals to control or lose weight, may find it more difficult to be successful academically. In 2012, ABC news cites the Japanese health ministry survey which found a record 29% of Japanese women in their 20's were considered underweight (having a BMI below 18.5). This has been attributed to dieting practices including regularly skipping meals and habitually missing breakfast. If considered in light of the cited research on cognitive functioning and glucose levels, this may be affecting the attention span, performance and classroom behavior of many of the women at the university level (Fujita, 2012).

Medical researcher, Hiroko Kodama also found a connection between underweight females and cognitive functioning. Kodama's findings cite symptoms such as "...loss of clear thinking, good judgment, and concentration" even in subjects who do not classify as clinically underweight in terms of medical conditions like Anorexia. Interestingly, medical researchers like Kodama believe, that

underweight women who exhibit these symptoms even to a mild degree, “is a cause of concern.” (2010:p.286).

Discussion

As university educators we should try to investigate these issues further with our own students. Perhaps assigning learners to keep a food diary for a month and then ask them to compare it to their class performance and test results. In terms of priming, the biggest challenge seems to be raising awareness of any subconscious priming affect. Therefore, asking students to log gender stereotypes which they encounter and jot down their feelings about it may be effective if they are able to isolate the influences. Or, replicating a small empirical study, like the one mentioned above, asking them to answer the questions (like in Figure 2). Follow up by assigning them to watch gender-positive speeches and compare for any effect in the replies. There might be argument that presenting only gender-positive information may not be realistic for Japanese female students entering lingering gender-bias in the workforce. However, it can also be argued that the role of educators is, not only to teach learners important and useful information, but also to motivate them to perform at their best to aim high in life. The difficult realities that female university students face in finding a good job and balancing home and life commitments are everywhere. If we can find true and realistic, yet successful, gender-positive examples to show female students, which motivate and challenge them- we fulfill the education role.

Conclusion

With regard to both the mental and physical state of learners before entering the classroom, there is a need for further study into connections to curriculum and classroom dynamics. These studies on priming and blood sugar on cognition need further investigation. As many of the results were found abroad, it needs to be determined whether these studies can be replicated with female students in Japan. It is unclear whether there will be cultural, dietary or other unforeseen considerations which create different results. However, even a small, class-based study to see if there is a positive effect on behavior, attitudes and/or future success is worth investigating.

Skipping meals or negative priming might be simple reasons why some students fall behind while others succeed. It may also be an indication of why some students work diligently toward future successful goals and others do not apply themselves. Overall, there is strong evidence that learners are indeed affected by the world outside both physically and mentally. As this is especially relevant for the young Japanese female student, instructors at womens' universities should be particularly aware of the effect of negative priming and low blood sugar on learner ability. There are many tangible ideas for future studies to further test these research assumptions, as well as more practical classroom considerations if they test true. There is much a university instructor can learn from these studies about how students behave in the classroom. This research also highlights how we might better motivate learners to perform at their best now and in the future.

References

- Bargh, J. A., M. Chen & L. Burrows (1996) "Automaticity of Social Behavior: Direct Effects of Trait Construct and Stereotype Activation on Action" *Journal of Personality and Social Psychology* 71(2):230-244 (http://www.yale.edu/acmelab/articles/bargh_chen_burrows_1996.pdf viewed 2012, September)
- Cabinet Office of Japan (2010) Part 2 Outline of Survey Results VII Outlook on Life. *The Cabinet Office site (English Home)* Retrieved September 1, 2012 from <http://www8.cao.go.jp/youth/english/worldyouth7-e/html/no2-7-3.html>
- Danziger, S., J. Levav & L. Avnaim-Pesso (2011) "Extraneous Factors in Judicial Decisions," *PNAS* 108: 6889-92 As cited in Kahneman, D (2011).
- Fujita, Akiko (2/17/2012) "Diminishing Waistlines, a Japanese Health Problem" *ABC News* (<http://abcnews.go.com/blogs/headlines/2012/02/diminishing-waistlines-a-national-health-problem-in-japan/> viewed 2012, August)
- Gailliot, M. T. and Roy F. Baumeister (2007) "The Physiology of Willpower: Linking Blood Glucose to Self-Control," *Personality and Social Psychology Review* 11: 303-27
- Hashimoto, Hiroko (2009) Economic and Political Struggles of Women in Japan. *French Institute for Research on Contemporary Japan*. Retrieved September 10, 2012 from <http://www.mfj.gr.jp/web/wp/WP-L-04-IFRJC-Hashimoto-09-03.pdf>
- Kahneman, Daniel (2011) "Thinking Fast and Slow" New York: Penguin Books
- Kodama, Hiroko (2010) Problems of Underweight in Young Females and Pregnant Women in Japan *JMAJ* 53(5): 285-289 (http://www.med.or.jp/english/journal/pdf/2010_05/285_289.pdf viewed 2012, Sept)
- Komuro, Yoshie (2012) "Life Balance" TedXTokyo conference. Web: <http://www.youtube.com/watch?v=2Y4E2uCuJaE>
- Matsui, Kathy (2011) "Womenomics: The Time is Now" Goldman Sachs publication. Web:<http://www.goldmansachs.com/our-thinking/topics/women-and-economics/womenomics-2011/index.html>
- Ministry of Health, Labour and Welfare (2010) 「平成 21 年国民健康・栄養調査結果の概要について」"National Health and Nutrition Examination Survey, 2009."(<http://www.mhlw.go.jp/stf/houdou/2r9852000000xtwq.html> viewed 2012, August)
- Parrish, Rogue (2010) "The BMI for Anorexics" (<http://www.livestrong.com/article/145890-the-bmi-for-anorexics/> viewed 2012, August)
- Rydell, R., K. Shiffrin, K. Van Loo & M. Rydell (2010) Stereotype threat prevents perceptual learning. *Proceedings of the National Academy of Science*, 107(32), 14042-14047. Retrieved August 20, 2012 from <http://www.pnas.org/content/107/32/14042.full.pdf+html?sid=0034c76c-73ee-49b7-b851-3df57f92054c>
- Shigeta, K., Y. Sasada, K. Suzuki, O. Kashimura (2008/11/11) 「若年女性の瘦身志向が血液ヘモグロビン値を指標とした貧血に与える影響」"Effects of desire for slenderness on anemia based on blood hemoglobin levels among young women" *Journal for the Integrated Study of Dietary Habits* Vol 19 (2) 155-162
- Wang, X. T and R. D. Dvorak (2010) "Sweet Future: Fluctuating Blood Glucose Levels Affect Future Discounting" *Psychological Science* online URL: <http://pss.sagepub.com/content/21/2/183>

[Received September 27, 2012]