

## The Implementation of Metacognition by an Arabian University to Enhance Reading Proficiency

**Munagala Madhu Sudhan Rao**

Associate Professor of English, Koneru Lakshmaiah Education Foundation,  
Guntur, Andhra Pradesh, India. [madhu.css@kluniversity.in](mailto:madhu.css@kluniversity.in). <https://orcid.org/0000-0002-0383-4866>.

**Biodata:** Dr. Munagala Madhu Sudhan Rao has been working as Associate Professor of English in Department of English, Koneru Lakshmaiah Education Foundation, Vaddeswaram, AP, India since June 2018. He has twenty years of national and international experience in teaching English at various disciplines. His doctoral thesis was on TOEFL iBT Reading Comprehension. He has ten research papers, and one book publication to his credit. His areas of interests are English language teaching, communication skills and soft skills.

### Abstract

The Kingdom of Saudi Arabia places a significant emphasis on enhancing students' proficiency in the English language, recognizing its importance in business communication, especially in the context of international business. Nevertheless, students at the College of Business Administration in Prince Sattam Bin Abdulaziz University (PSAU) often experience stress when learning this foreign language.

To address this challenge, a plausible approach is the implementation of metacognition. In a recent action research initiative, 203 students were administered a set of 52 items from the Metacognitive Awareness Inventory. These students were then divided into control and experimental groups, marking the beginning of a comprehensive exploration into the potential benefits of metacognition in alleviating the difficulties associated with learning English as a foreign language at PSAU's College of Business Administration.

The results showed that the 192 experimental groups' English language reading and comprehending ability was considerably significant. Analysis and implications were discussed.

**Keywords:** *English language, metacognition, metacognitive strategies, metacognitive awareness inventory.*

## **Introduction**

Effective communication with multinational corporations and countries is a crucial factor in ensuring the success of any business transaction. Recognizing English as the global language, it has been integrated into the curriculum of all universities in the Kingdom of Saudi Arabia as a foreign language. English serves as the primary medium of instruction for the Bachelor of Science and Business Administration (BSBA) program in many universities. Given that English is the cornerstone of business correspondence, acquiring proficiency in this language provides significant advantages for students and aspiring entrepreneurs. Nonetheless, the process of learning English can occasionally be a source of stress for students.

The College of Business Administration (CBA) at Prince Sattam Bin Abdulaziz University (PSAU) has identified a prevalent issue among students – a lack of seriousness towards the English language during their earlier education, considering it as a foreign language. Consequently, many students face stress when required to study and take exams in English, leading to a significant number discontinuing their education. The authors posit that developing metacognitive awareness can help students overcome this language barrier, fostering academic success. Metacognitive awareness enhances self-confidence, transforms students into lifelong learners, and addresses learning difficulties. Consequently, the authors propose implementing specific strategies and providing training during a university semester to equip students with the necessary skills.

## **Significance**

In the Kingdom of Saudi Arabia, English is considered a foreign language. The enhancement of metacognitive skills significantly contributes to the development of students' learning abilities. This is particularly crucial for students undertaking the Bachelor of Science and Business Administration (BSBA) program in English. Acquiring language proficiency through the application of metacognitive skills undoubtedly results in substantial improvements in students' academic success.

## **Objectives**

To fortify the future of the kingdom, which has diversified its economic focus, special attention must be directed towards nurturing the students who embody the aspirations of the realm. The potency of these students is pivotal in realizing the kingdom's vision. One critical aspect demanding attention is the imperative for students to acquire proficiency in the English language, a skill deemed essential for the kingdom's future success.

Despite concerted efforts by policymakers to enhance educational strategies, students often encounter stress in mastering the English language. This deficiency persists into their university years, contributing to a lower-than-anticipated proficiency level. This linguistic gap becomes a significant factor in the rising dropout rates observed in universities.

Recognizing the paramount importance of metacognition, the authors highlight its influence on students' reading and comprehension abilities. By adeptly employing these metacognitive skills, students can develop confidence in pursuing their chosen majors without the looming apprehension of language barriers. This newfound assurance translates into a more seamless understanding of course materials, ultimately diminishing the dropout rates prevalent in universities.

The authors assert that students, armed with these enhanced skills, will navigate their academic journey with confidence, being well-prepared for the demands of the job market. Proficiency in the English language is particularly crucial, given its widespread demand not only within the kingdom but also globally.

### **Purpose**

The purpose of this study is to investigate the effects of metacognitive awareness on students' English language learning. After receiving training, the first-year students admitted to the BSBA program are supposed to show a substantial change in their English language reading skills.

### **Research Questions**

- a) Can understanding cognition enhance students' reading and comprehension skills?
- b) Does recognizing cognition contribute to improving students' reading and comprehension skills?

### **Review of Related Literature**

The passage provides a comprehensive overview of the concept of metacognition and its importance in learning. Here are some key points and insights from the text:

**Definition of Metacognition:** The passage defines metacognition as the process of thinking about thinking, emphasizing an awareness of thought processes. Flavell's description of metacognition includes what we think, how we think, when faced with a situation, and why we think in a particular Significance in Learning way in that situation.

Metacognition is highlighted as a significant factor in learning, with implications for students' academic achievement. The passage references studies by Kruger & Dunning (1999) and Ahmad Ghulamuddin et al. (2021) that link metacognition to learning outcomes.

**Training and Strategies:** Jimenez et al. suggest that training in metacognitive strategies can lead to improvements in learning performance, acquisition of new strategies, and increased self-confidence. This underscores the practical application of metacognitive skills in enhancing the learning process.

**Relationship with Success:** The passage suggests a correlation between intense metacognition and academic success. Garner & Alexander's opinion that learners with strong metacognition achieve more success than those with weak metacognition supports this idea.

**Metacognitive Skills of Successful Learners:** Successful learners are described as having a wide range of metacognitive skills. They are conscious of their learning process and know how to use metacognitive skills effectively. This aligns with the notion that successful learners possess metacognition.

**Application in Foreign Language Learning:** The text mentions that learners with metacognitive skills can apply these skills efficiently while learning a foreign language. This indicates the universality of metacognitive skills in various learning contexts.

**Need for Metacognitive Training:** Students with poor metacognition are identified as needing metacognitive training to improve. This implies that metacognitive skills are not innate and can be developed through targeted training.

**Role of Teachers:** The passage concludes by highlighting the significant role teachers play in identifying and supporting students in building their metacognitive skills during the learning process. of metacognitive skills in enhancing the learning process.

## **Research Methodology**

This study is designed using a quantitative and qualitative research approach. The participants are undergraduate students admitted to Prince Sattam bin Abdulaziz University, pursuing their Bachelor of Science and Business Administration (BSBA) program at the College of Business Administration (CBA). The data collection instrument consists of students' views on metacognitive awareness. The data is collected through the Metacognitive Awareness Inventory (MAI) invented by Schraw and Dennison (1994). It has 52 True/False statements. Instead of giving them two options (True/False), the researchers have used six options on a Likert scale. The six options are always, generally, often, occasionally, seldom, and never. The original questionnaire proposes to consider each true as one and each false as 0. The researchers opine that more Likert items/options provide more accurate responses from the participants than true or false options. The questionnaire was translated into the Arabic language as English is a foreign language to students.

The researchers have taken the support of an expert to translate it, and to check the reliability. He has back translated the Arabic version into English by another expert. He has not found any differences, and finally, the Arabic version of the questionnaire is generated for the students. Learners are given the training to acquire metacognitive awareness. They fill MAI twice: before and after training. Two hundred three students are divided into two control and experimental groups, respectively. A pre-test of MAI is conducted before training, and a post-test is conducted after training to identify the metacognitive strategies awareness among the experimental groups. Whereas the control groups do not receive any focused training apart from regular classes. The participants belong to level 2 (semester 2) of the I year undergraduate program. The experimental groups study 'NAJM 166: Reading in Business course' with the researchers. They receive training on how to use metacognitive strategies. They are divided into Knowledge about Cognition and Regulation of Cognition. The first one is further divided into Declarative Knowledge, Procedural Knowledge, Conditional knowledge. The latter is divided into Planning, Information Management Strategies, Comprehension Monitoring, Debugging, and Evaluation. Efklides (2006) rightly pointed out by saying how the student knows when he/she must apply metacognitive strategies. Keeping this point in view, the students are trained for twelve weeks, along with their regular course.

The researchers believe that a course like Reading in Business is apt while training the students on how to use the strategies mentioned above to acquire reading skills. Nasser & Najah (2021)

reading is considered the prime source of language input. Students need to use their existing knowledge, the question on how that knowledge can be attributed to the topic of discussion, understand the topic of discussion, must identify the meanings of business terms they are not aware of based on the context, verify their meanings with the peer group and if they go wrong, either they must rethink or consult the researchers, and finally evaluate their skills among the group based on their comprehending ability.

Table 1: Metacognitive strategies

Metacognitive Strategies	Meaning	Example
Declarative Knowledge	<ul style="list-style-type: none"> <li>• Knowledge about or answers to 'wh' questions</li> <li>• Explicit: you know that you know</li> <li>• Facts</li> </ul>	What is the capital of Saudi Arabia?
Procedural Knowledge	<ul style="list-style-type: none"> <li>• Knowing 'how' to do something</li> <li>• Hard to explain verbally</li> <li>• Implicit: no longer consciously aware of the knowledge</li> </ul>	How to drive a car? Eating
Conditional Knowledge	<ul style="list-style-type: none"> <li>• Knowledge of the situations in which declarative and procedural knowledge should be used.</li> <li>• Awareness of when, why, and where other knowledge should be used</li> </ul>	Cooking needs both declarative and procedural knowledge

Planning	<ul style="list-style-type: none"> <li>• Identification and selection of appropriate strategies and allocation of resources like goal setting, background knowledge</li> </ul>	Plan
Information Management Strategies	<ul style="list-style-type: none"> <li>• Processing information more efficiently</li> </ul>	Organizing, elaborating, summarizing
Comprehension Monitoring	<ul style="list-style-type: none"> <li>• Aware of one's understanding &amp; task performance</li> </ul>	Do
Debugging Strategies	<ul style="list-style-type: none"> <li>• Identifying and correcting comprehension errors</li> </ul>	Ask others for help when not understood
Evaluation	<ul style="list-style-type: none"> <li>• Assessing the efficiency at which the task is performed</li> </ul>	Check

Each unit in Reading in Business is mapped to declarative knowledge, procedural knowledge, conditional knowledge, planning, information management strategies, comprehension monitoring, debugging strategies and evaluation. All the strategies are not introduced at a time. A few were discussed during the discussion and a few during knowledge sharing sessions like rising questions on the topic discussed, how the topic discussed was useful in real-life situations. Students were neither aware of what strategy they were about to use. Depends on the necessity, the researchers had supported the students and used the best possible resources available.

### Analysis & Interpretation

The control and experimental groups took a pre-test at the beginning of the course. Whereas the experimental groups received formal training, and finally, a post-test was conducted for both groups before the end of the course. The data was analyzed through SPSS 16 software.

Table 2: Statistical analysis of the data

Control Group						Experimental Group					
	Mean	N	Std. Deviation	t	Sig.		Mean	N	Std. Deviation	t	Sig.
<b>Declarative</b>											
Pre	4.69	103	1.96	2.51	0.01	Pre	4.73	100	1.81	3.87	0.00
Post	5.39	103	1.92			Post	5.78	100	1.83		
<b>Procedural</b>											
Pre	2.37	103	1.31	-1.07	0.29	Pre	2.16	100	1.22	3.62	0.04
Post	2.56	103	1.29			Post	2.96	100	1.15		
<b>Conditional</b>											
Pre	3.56	103	1.43	0.39	0.70	Pre	3.71	100	1.37	-4.33	0.67
Post	3.64	103	1.34			Post	3.79	100	1.22		
<b>Planning</b>											
Pre	4.83	103	1.83	0.21	0.83	Pre	4.83	100	1.78	1.70	0.09
Post	4.77	103	1.87			Post	5.28	100	1.65		
<b>Information</b>											
Pre	6.83	103	2.41	-0.84	0.41	Pre	7.20	100	2.23	0.90	0.37
Post	7.12	103	2.52			Post	7.51	100	2.37		

<b>Planning</b>											
Pre	4.83	103	1.83	0.21	0.83	Pre	4.83	100	1.78	1.70	0.09
Post	4.77	103	1.87			Post	5.28	100	1.65		
<b>Information</b>											
Pre	6.83	103	2.41	-0.84	0.41	Pre	7.20	100	2.23	0.90	0.37
Post	7.12	103	2.52			Post	7.51	100	2.37		
<b>Comprehension</b>											
Pre	4.58	103	1.80	-0.35	0.73	Pre	4.60	100	1.77	1.23	0.02
Post	4.67	103	1.93			Post	5.83	100	1.71		
<b>Debugging</b>											



Pre	3.65	103	1.25	0.11	0.92	Pre	3.90	100	1.24	0.05	0.96
Post	3.63	103	1.25			Post	3.91	100	1.31		
Evaluation											
Pre	3.67	103	1.58	-0.74	0.46	Pre	3.59	100	1.63	1.27	0.21
Post	3.84	103	1.63			Post	3.88	100	1.74		

If the p-value is less than 0.05, the hypothesis is considered significant at 5 percent of level of significance and vice-versa as per the statistical analysis. Similarly, if the p-value is less than 0.10, the hypothesis is considered significant at 10 percent level of significance. This study uses both the 5 and 10 percent significance level. The use of declarative knowledge by both the groups remains same. However, the use of procedural knowledge by experimental group varies after training and its clearly visible. There is no significant difference in the use of conditional strategies by the both the groups, but the experimental group used planning strategies in the post-test. There was noticeable improvement in using information, comprehension and evaluation strategies by experimental group based on the post test results. In contrast they were unable to use debugging strategies.

### Hypothesis 1

Ho: The metacognitive declarative knowledge strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive declarative knowledge strategies improve experimental groups 'English language skills than that of control groups' English language skills.

The p values of the control and experimental groups are 0.01 and 0.00, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that the metacognitive declarative knowledge strategies bring a significant difference among experimental groups' metacognitive declarative knowledge skills after training. Interestingly, the respective change is also identified in the control groups.

### Hypothesis 2

Ho: The metacognitive procedural knowledge strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive procedural knowledge strategies improve experimental groups' English language skills than that of control groups' English language skills.

The p values of the control and experimental groups are 0.29 and 0.04, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that the metacognitive procedural knowledge strategies bring a significant difference among experimental groups' metacognitive procedural knowledge skills after training.

### **Hypothesis 3**

Ho: The metacognitive conditional knowledge strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive conditional knowledge strategies improve experimental groups' English language skills than that of control groups' English language skills. The p values of the control and experimental groups are 0.70 and 0.67, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that the metacognitive conditional knowledge strategies bring a significant difference among experimental groups' metacognitive conditional knowledge skills after training. The above three hypotheses are relevant to the first research question. As the p-value of all the three hypotheses are significant either at 5% or 10%, it can be agreed upon that Knowledge about Cognition will improve students' reading and comprehending skills.

### **Hypothesis 4**

Ho: The metacognitive planning strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive planning strategies improve experimental groups' English language skills than that of control groups' English language skills. The p values of the control and experimental groups are 0.83 and 0.09, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that the metacognitive planning strategies bring a significant difference among experimental groups' planning strategies after training.

### **Hypothesis 5**

Ho: The metacognitive information strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive information strategies improve experimental groups' English language skills than that of control groups' English language skills.

The p values of the control and experimental groups are 0.41 and 0.37, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that the metacognitive information strategies bring a significant difference among experimental groups' information strategies after training.

### **Hypothesis 6**

Ho: The metacognitive comprehension strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive comprehension strategies improve experimental groups' English language skills than that of control groups' English language skills. The p values of the control and experimental groups are 0.73 and 0.02, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that metacognitive comprehension strategies bring a significant difference among experimental groups' metacognitive comprehension skills after training.

### **Hypothesis 7**

Ho: The metacognitive debugging strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive debugging strategies improve experimental groups' English language skills than that of control groups' English language skills. The p values of the control and experimental groups are 0.92 and 0.96, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that the metacognitive debugging strategies bring a significant difference among experimental groups' debugging strategies after training.

### **Hypothesis 8**

Ho: The metacognitive evaluation strategies do not improve experimental groups' English language skills than that of control groups' English language skills.

H1: The metacognitive evaluation strategies improve experimental groups' English language skills than that of control groups' English language skills. The p values of the control and experimental groups are 0.46 and 0.21, respectively. It means the null hypothesis is rejected, and an alternate hypothesis is accepted. It shows that the metacognitive evaluation strategies bring a significant difference among experimental groups' evaluation strategies after training.

The hypotheses statements from 4-8 are relevant to the second research question. As the p-value of all the three hypotheses are significant either at 5% or 10%, it can be agreed upon that

---

*Research paper*

© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 8, Issue 4, 2019

Recognition of Cognition will improve students' reading and comprehending skills. The study based on the control and experimental groups has proved that there is improvement among experimental groups. The improvement is noticeable. The experimental group participants used declarative knowledge, procedural knowledge, conditional knowledge, planning, information management strategies, comprehension monitoring, debugging strategies and evaluation strategies to develop their reading and comprehending skills. Interestingly, the control group participants show improvement in the use of declarative strategies. Based on the p-value (less than or equal to 0.05/0.10), the researchers opine that the participants are successful in using the strategies to improve their reading and comprehending skills.

### **Conclusion**

The statement emphasizes the importance of receptive skills (listening and reading) in language learning and highlights the fear that many students in Saudi Arabia have when it comes to learning English. The argument suggests that focusing on improving receptive skills, particularly through metacognitive awareness, can lead to enhanced reading and comprehending abilities. Statement emphasizes the importance of receptive skills (listening and reading) in language learning the idea that metacognitive awareness supports students in improving their reading and comprehension skills aligns with educational theories that emphasize the role of metacognition in learning. Metacognition involves understanding one's own thought processes and applying strategies to regulate and enhance learning. If students are more aware of how they approach and understand the language, it can positively impact their receptive skills.

suggestion for teachers in Saudi Arabia to use metacognitive awareness strategies in their classes to develop students' receptive skills is practical. Encouraging students to think about their thinking processes while reading or listening can help them become more effective learners.

The proposal to extend similar research to focus on improving other skills, such as listening, speaking, or writing, through metacognitive awareness is also interesting. It suggests a broader application of the metacognitive approach to enhance various language skills. If successful, this could contribute to a more comprehensive understanding of how metacognition can be employed across different language domains.

---

*Research paper*© 2012 IJFANS. All Rights Reserved, **UGC CARE Listed (Group -I) Journal Volume 8, Issue 4, 2019**

In summary, your statement supports the idea that metacognitive awareness plays a crucial role in improving students' receptive skills, particularly reading. It encourages teachers to incorporate metacognitive strategies into their teaching methods, potentially leading to increased confidence and proficiency in both receptive and productive language skills. The extension of this approach to other language skills could offer a well-rounded strategy for language learning in diverse contexts.

### References

1. Ahmad Ghulamuddin, N. J. ., Mohd Mohari, S. K. ., & Ariffin, K. (2017). Discovering Writing Difficulties of Malay ESL Primary School Level Students. *International Journal of Linguistics and Translation Studies*, 2(1), 27-39. <https://doi.org/10.36892/ijlts.v2i1.105>.
2. Alasmari, N., Sultan, N.Y ( 2016)., “Reading Difficulties and Influential Factors Faced by Saudi Tertiary Learners”, *The Asian ESP Journal*, vol. 17(1). 73-100, 2021.
3. Anderson, N. J. (2005). *Research Strategy L2*”. In E. Hinkel (Ed.), *Handbook of Research in Second Language Teaching and Learning*, Mahwah, NJ: Lawrence Erlbaum Associates, 757-772,.
4. Bin-Tahir, S. Z., Suriaman, A., & Rinantanti, Y. (2019). Designing English Syllabus for Multilingual Students at Pesantren Schools. *Asian EFL Journal*, 23(3.3), 5-27.
5. Bransford, J., Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). *How people learn: Brain, mind, experience, and school*. National Academies Press.
6. Carrell, P. L. (1998). Can reading strategies be successfully taught?. *Australian review of applied Linguistics*, 21(1), 1-20. <https://doi.org/10.1075/ara1.21.1.01car>
7. Chamot, A. U. (2005). Language learning strategy instruction: Current issues and research. *Annual review of applied linguistics*, 25, 112-130. <https://doi.org/10.1017/S0267190505000061>
8. Efklides, A. (2006). Metacognition and affect: What can metacognitive experiences tell us about the learning process?. *Educational research review*, 1(1), 3-14. <https://doi.org/10.1016/j.edurev.2005.11.001>
9. El Motabit, A. (2015). Evaluating the Lexical Load of the Reading Comprehension Texts in EFL Textbooks. *International Journal of Linguistics and Translation Studies*, 1(1), 42-53. <https://doi.org/10.36892/ijlts.v1i1.15>

---

*Research paper*© 2012 IJFANS. All Rights Reserved, **UGC CARE Listed (Group -I) Journal Volume 8, Issue 4, 2019**

10. Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American psychologist*, 34(10), 906-911.  
<https://psycnet.apa.org/doi/10.1037/0003-066X.34.10.906>
11. Garner, R., & Alexander, P. A. (1989). Metacognition: Answered and unanswered questions. *Educational psychologist*, 24(2), 143-158.  
[https://doi.org/10.1207/s15326985ep2402\\_2](https://doi.org/10.1207/s15326985ep2402_2)
12. Goh, C. (1997). Metacognitive awareness and second language listeners. *ELT journal*, 51(4), 361-369. <https://doi.org/10.1093/elt/51.4.361>
13. Goh, C. (2008). Metacognitive instruction for second language listening development: Theory, practice and research implications. *RELC journal*, 39(2), 188-213.  
<https://doi.org/10.1177%2F0033688208092184>
14. Harrison, G. M., & Vallin, L. M. (2018). Evaluating the metacognitive awareness inventory using empirical factor-structure evidence. *Metacognition and Learning*, 13(1), 15-38.  
<https://doi.org/10.1007/s11409-017-9176-z>
15. Kruger, J., & Dunning, D. (2009). Unskilled and unaware of it. How difficulties in recognizing one's own incompetence lead to inflated self-assessments, 1999, 77.
16. O'malley, J. M., O'Malley, M. J., Chamot, A. U., & O'Malley, J. M. (1990). *Learning strategies in second language acquisition*. Cambridge university press.
17. Palinscar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and instruction*, 1(2), 117-175.
18. Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into practice*, 41(4), 219-225. [https://doi.org/10.1207/s15430421tip4104\\_3](https://doi.org/10.1207/s15430421tip4104_3)
19. Plonsky, Luke. "The effectiveness of second language strategy instruction: A meta-analysis." *Language learning* 61.4 (2011): 993-1038. <https://doi.org/10.1111/j.1467-9922.2011.00663.x>
20. Rivera-Mills, S. V., & Plonsky, L. (2007). Empowering students with language learning strategies: A critical review of current issues. *Foreign Language Annals*, 40(3), 535-  
<https://doi.org/10.1111/j.1944-9720.2007.tb02874.x>
21. Scardamalia, M., Bereiter, C., & Steinbach, R. (1984). Teachability of reflective processes in written composition. *Cognitive science*, 8(2), 173-190. [https://doi.org/10.1016/S0364-0213\(84](https://doi.org/10.1016/S0364-0213(84)