

**WORKING MEMORY COMPONENTS, NEED FOR COGNITION AND
FLUID INTELLIGENCE AMONG SCHOOL-AGE CHILDREN**

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An Undergraduate Thesis submitted to the Department of Psychology,
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BACHELOR OF ARTS IN PSYCHOLOGY

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ACCEPTANCE SHEET

This undergraduate thesis entitled **WORKING MEMORY COMPONENTS, NEED FOR COGNITION AND FLUID INTELLIGENCE AMONG SCHOOL-AGE CHILDREN** prepared and submitted by **FERNANDO S. GASCON** and **LARA JESSA F. MACARAEG**, in partial fulfilment of the requirements for the degree of **BACHELOR OF ARTS IN PSYCHOLOGY** is hereby approved and accepted.


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BIOGRAPHICAL SKETCH

Born on December 7, 1997 at Barangay Burgos, Cuyapo, Nueva Ecija and lived his life on this community, **Fernando S. Gascon** a fourth year graduating student taking up Bachelor of Arts in Psychology at Central Luzon State University. Apart from this, he had also finished a 200 Hour On-The-Job Training on a clinical setting at Sunrise Hill Therapeutic Community Inc, New Manila, Quezon City. He has also done some extracurricular activities which includes being a Student Proctor and Student Assistant Supervisor on the College Admission Test (CAT), Central Luzon State University Science City of Munoz, Nueva Ecija. He was a member of the CLSU-Psychological Society on which he was elected as an auditor of the organization on School Year 2016-2017. He was also a member of CLSU Peer Facilitators Group under the Office of the Student Affairs in CLSU. During his college days he received various awards which includes a recognition of his being a university scholar during the 2nd semester of Academic Year 2017-2018 given on 11th day of April 2018 during the Honors Day Celebration held at the University Auditorium, Central Luzon State University. To further enhance his knowledge about the field he was studying, he attended seminars including the Annual Psychological Association of the Philippines – Junior Affiliates Conventions together with training and joint ventures like the What it takes to be a Peer Facilitator – Year End Leadership Seminar held at Central Luzon State University and Summer Camp for Peer Facilitator MMSU and CLSU Joint Venture held at Mariano Marcos State University, Batac, Ilocos Norte.

BIOGRAPHICAL SKETCH

Lara Jessa F. Macaraeg, born on February 11, 1998 and raised in Villa Rosenda, Talugtug, Nueva Ecija, is a college student who is working towards becoming a successful individual in whatever endeavour she wants in the future and who will be graduating with the Degree of Bachelors of Arts in Psychology in June of 2018 from Central Luzon State University (CLSU) in Science City of Munoz, Nueva Ecija.

During college, Lara Jessa's activities were many: she has undergone a 200 Hour On-the-Job Training at People's Recovery, Empowerment and Development Assistance, Olongapo City, Zambales; Student Proctor at College Admission Test last January 13-14 and Student Assistant of the Ladies Dorm6-Sampaguita Residence at same university from 2016 to present; an active member of the CLSU-Psychological Society in which she became a Secretary and Vice President during the S.Y. 2016-2017 and 2017-2018; a Volunteer Student of the CLSU-Peer Facilitators Group under the Office of the Student Affairs, 2017-2018; and, a consistent academic achiever receiving various recognitions and awards including the recognition of being a consistent College Scholar from 2014 to present. Finally, she also attends seminars to further learn, which includes the Annual Psychological Association of the Philippines – Junior Affiliates Conventions and numerous trainings such as Orientation-Seminar on PREDA's Program and Services & Other Related Laws Protecting Children & Women: RA 9208 & 10364, RA 9262 and RA 9344 & 10630 on June 28, 2017 and Forensic Psychiatry with the topic: "Assessment of Common and Uncommon Mental Illness," "Management of Mental Illness," and "Inside and Outside of the Healthcare Setting" on May 28, 2017

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-The Researcher

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ABSTRACT

GASCON, FERNANDO S. & MACARAEG, LARA JESSA F., Bachelor of Arts in Psychology, College of Arts and Sciences, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, June 2018. WORKING MEMORY COMPONENTS, NEED FOR COGNITION AND FLUID INTELLIGENCE AMONG SCHOOL-AGE CHILDREN

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Existing literature suggest that working memory provide significant link on fluid intelligence and that of need for cognition to fluid intelligence however the predicting value of working memory components and need for cognition to fluid intelligence specifically among school-age is not yet analyzed. In the current study, we try to identify if working memory components and need for cognition can predict fluid intelligence performance. Form 400 students of public and private schools around Pampanga and Nueva Ecija, only 210 respondents are carefully selected and qualified for these studies. Working memory components utilized tasked such as listening sentence for central executive, digit forward test for phonological loop and memory for the object for the visuospatial sketchpad. For the need for cognition, Need for Cognition Scale-Filipino Version was utilized. Finally, to measure the fluid intelligence test the used of Raven's Standard Progressive Matrices is observed. Results suggest that only central executive and visuospatial sketchpad serve as predictors of fluid intelligence but vary across grade level.

Keywords: working memory components, motivation, fluid intelligence

REFERENCES

- Au, J., Sheehan, E., Tsai, N., Duncan, G.J., Buschkuehl, M., & Jaeggi, S.M. (2014). Improving Fluid Intelligence with training on Working memory: a meta-analysis. *Journal of Psychonomic Bulletin & Review*.
- Baddeley, Alan (2007). Working memory. *Articles Science*, Vol. 255. Medical Research Council, Applied Psychology Unit, Cambridge CB2 2EF, United Kingdom
- Cacioppo, Petty, & Kao, 1984. Need for Cognition Scale.
- Carnevale, J. J., et al. Individual differences in need for cognition and decision-making competence among leaders. *Personality and Individual Differences* (2010), doi:10.1016/j.paid.2010.07.002
- Cornoldi, C., Vecchia, R.D., Tressoldi, P.E., (1995). Visuo-spatial memory limitations in low visuo-spatial high verbal intelligence children. *J. Psychol. Psychiatry* 36, 10053-1064
- Engel de Abreu, P.M.J., Conway, A.R.A., & Gathercole, S., (2010). Working memory and Fluid Intelligence. *Journal of Intelligence*, doi: 10.1016/j.intell.2010.07.003
- DeYoung, C. G. (2011). Intelligence and personality. In R. J. Sternberg & S. B. Kaufman (Eds.), *The Cambridge Handbook of Intelligence* (pp. 711–737). New York: Cambridge University Press.
- Fung, Wenson Wen-Yuan (2015). Working memory components as predictors of word problem solving: Does rapid automatized naming speed mediate the relationship? June 2015 UC Riverside Electronic Theses and Dissertations
- Fleischhauer, M., Enge, S., Brocke, B., Ullrich, J., Strobel, A., & Strobel, A., (2012). Same or different? Clarifying the relationship of Need for Cognition to personality and
- Fry, Astrid F., and Hale, Sandra (2000). Relationships among processing speed, working memory, and fluid intelligence in children. *Biological Psychology*
- Groome, D., Dewart, H., Esgate, A., Gurney K., Kemp, R., & Towell, N. (1999). Memory. *An Introduction of Cognitive Psychology*, 59-82.
- Hill, B. D., Foster, J. D., Sofko, C., Elliott, E. M., & Shelton, J. T., McCain, J., Grouver, Wm. D., (2012). Need for cognition is related to higher general intelligence, fluid intelligence, and crystallized intelligence, but not on working memory. *Journal of Research on Personality*.

- Hill, B. D., Foster, J. D., Sofko, C., Elliott, E. M., & Shelton, J. T. (2016). The interaction of ability and motivation: Average Working memory is required for Need for Cognition to positively benefit intelligence and the effect increases with ability. *Journal of Research in Personality and Individual Differences*.
- Horn, J.I., & Cattell, R. B. (1967). Age differences in fluid and crystallized intelligence. *Acta Psychologica*, 26, 107-129
- Jaeggi, S.M., Studer-Luethi, B., Buchkuehl, M., Su, F.F., Jonides, J., & Perrig, W.J.. (August 8, 2010). The relationship between n-back performance and matrix reasoning-implications for training and transfer. *Journal of Research in Intelligence*, doi: 10.1016/j.intel.2010.09.01
- Just, M.A. Carpenter, P.A., (1994). A capacity theory of comprehension: individual differences in working memory. *Psychol. Rev.* 99,122-149
- Kaufman, Scott Barry, (2014). Working Memory and Fluid Reasoning: Same or Different? Working memory and fluid reasoning: same or different? It depends. *American Scientific*. Kerback, J., & Kray, J., (2009). How useful is executive control training? Age differences in near and far transfer to task switching training. *Developmental Science*, 2009 nov;12(6):978-90. Doi:10.1111/j.1467-7687.2009.00846.x
- Luong, C., Strobel, A., Wollschlager, R., Greiff, S., Vainikainen, M-P., & Preckel, F., (2016). Need for cognition in children and adolescent: Behavioral correlates and relations to academic achievement and potential. *Journal of learning and individual differences*, doi: 10.1016/j.lindif.2016.10.019
- Marotz, L., & Allen, K.W. (2012). Middle Childhood and Cognitive Development. *Developmental Profiles Pre-Birth Through Adolescence*, 201.
- Neisser, U., et al. (1996). *Intelligence: Known and Unknowns*. American Psychological Association, Inc. 0003-066X/96/S2.00, Vol. 51, No. 2, 77-101
- Redick, Thomas S., Meier, Matthew E., Hicks, Kenny L., Kane, Michael J., Shipstead, Zack, Montroy, Janelle J., Unsworth, Nash & Hambrick D Zachary (2016). Cognitive Predictors of a common multitasking ability: Contributions from working memory, attention control and fluid intelligence. *Journal of Experimental Psychology: General* 2016, Col. 145, No. 11, 1473-1492. American Psychological Association.

- Santrock, J. (2013). Middle and Late Childhood: Cognitive Changes. *Life-Span Development, Fourth Edition*, 292-307.
- Short, Abigail C., & Reed, Julian A., 2017. Links between daily physical education, fluid intelligence, and fitness levels of underserved middle school youth. *Medicine and Science in Sports and Exercise*. DOI: 10.1249/01/mss.0000517418.10727.26
- Pickering, S.J., (2006). Assessment of Working memory in Children: Working memory and Education, 241-271