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**Godino, Juan D.; Fernández, Teresa; Gonzato, Margherita; Wilhelmi, Miguel R.**  
**Synergy between visual and analytical languages in mathematical thinking.**

Ubuz, Behiye (ed.) et al., CERME 8. Proceedings of the eighth congress of the European Society of Research in Mathematics Education, Antalya, Turkey, February 6–10, 2013. Ankara: Middle East Technical University (ISBN 978-975-429-315-9). 645-654 (2013).

Summary: Visualization is a research field of growing importance in mathematics education. However, the study of its nature and relationship with other forms of recording and reporting information continues to be subject of reflection. In this paper we propose a way of understanding the language and the visual thinking, and their relationship with the language and analytical thinking, using the theoretical tools of the “onto-semiotic approach” of mathematical knowledge. By analyzing the mathematical activity deployed in solving a task, we show cooperative relations between the visual and analytic languages.

*Classification:* G10 D30 D40 C50

*Keywords:* mathematical thinking; visualization; visual thinking; language; analytical thinking