To What Extent Does Text Simplification Improve Human Comprehension? Cognitive Evaluations for the Optimization of the Airbus Cockpit Controlled Language for Future Aircraft

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Résumé

The need for clear and unambiguous communication is vital in safety critical domains, and the current controlled language used in Airbus cockpits was carefully constructed to avoid ambiguity and complexity, and is designed to help pilots operate and navigate the aircraft (with the help of cockpit screen interfaces) in normal and abnormal (in cases of emergency or failures) situations. In order to optimize the existing language for future cockpits, we set out to assess the appropriate levels of simplification that would achieve more accurate and faster comprehension with minimum pilot training. We first delved into the controlled language domain to form an overview of the existing controlled languages, their context, and rules. From this research we attempted to find solutions for optimization, but at the same time we strove to offer an original contribution to the applied and ergonomic linguistics field through this work.

In order to test and improve comprehension, perception, and use of controlled languages in the cockpits (and to offer new assessment techniques for evaluating other controlled languages), we conducted evaluations by taking advantage of new tools and research in the cognitive sciences and controlled languages domains to apply linguistic hypotheses concerning text simplification limits. More particularly: might a more natural syntax help pave the way for better pilot comprehension and faster reaction times?

Results show that the Airbus controlled language could benefit from more natural language structures to enhance pilot comprehension and reduce training times. This new more optimized language fits effectively into the future disruptive cockpit concept and its more intuitive designs. We also show that there is a noticeable lack of controlled language evaluations in the field, as well as adequate methods of evaluating linguistic hypotheses using firm cognitive sciences methodology to satisfy ergonomic needs. We propose that in the future, all controlled language rules be systematically evaluated before being applied, especially in safety critical domains, to ensure that the prescriptive and proscriptive rules that make them are as efficient as possible, and that they truly reduce ambiguity and improve human comprehension and performance.

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References:

Condamines, A. (2018). Pour le développement d'une linguistique ergonomique: l'exemple des langues contrôlées. *Le travail humain*, *81*(3), 205-226.

Jahchan, N., Condamines, A., & Cannesson, E. (2016, July). To What Extent Does Text Simplification Entail a More Optimized Comprehension in Human-Oriented CNLs?. In *International Workshop on Controlled Natural Language* (pp. 69-80). Springer, Cham.

Kuhn, T. (2014). A survey and classification of controlled natural languages. *Computational Linguistics*, *40*(1), 121-170.

Ryan, R., (2018). Controlled Language in G. Budin, J. Humbley & C. Lauren (eds) *Languages for Special Purposes – An International Handbook*, Mouton de Gruyter (pp. 289-306).