PROGETTO 1/ PROJECT 1

Supervisore/*Supervisor*:   Andrea Fossati

Titolo/*Title:*   Neuropsychology of Disinhibition: Re-defining the measurement models and psychometric properties of the Stop Signal Task and Iowa Gambling Task

Corso /*PhD Course*   Scienze Cognitive e Comportamentali/Cognitive and Behavioral Sciences

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Descrizione del progetto/Project description (Tra i 2.000 e 3.000 caratteri spazi inclusi/ *Number of characters, including spaces*: 2.000 - 3.000):

Lack of inhibition/suppression is a common liability for a number of maladaptive behaviors (e.g., ADHD, Conduct Disorder, pathological gambling), research regarding the endophenotypes of impulsivity has the potential to inform our understanding of a broad range of psychopathology. Lab tasks often are intended to capture behavioral manifestations of underlying traits. However, the psychometric properties and measurement models of two widely used task, namely, the Stop-signal task (SST) and the Iowa Gambling Task (IGT) have been called into question. The SST has been extensively used to assess the fundamental cognitive-control function of inhibitory control over motor behavior. The critical behavioral parameter describing stopping efficacy is the Stop-signal response time (SSRT). However, it has been argued that SSRT estimates can be strongly distorted if participants strategically slow down their responses over the course of the experiment, resulting in the SSRT no longer reliably representing response-inhibition efficacy. Previous findings highlighted that different SSRT estimation procedures can strongly influence the distribution of SSRT values across subjects, which in turn can ramify into correlational analyses with other parameters, including brain–behavior correlations. The IGT is one of the most popular experimental paradigms for comparing complex decision-making across groups. Most commonly, IGT behavior is analyzed using frequentist tests to compare performance across groups, and to compare inferred parameters of cognitive models developed for the IGT. Notably, a Bayesian alternative for comparing performance, and a suite of different complementary model-based methods for assessing the cognitive processes underlying IGT performance has been proposed. IGT modeling analyses consistently challenge the notion that individual differences in intuitive and deliberate decision styles have a broad impact on decision-making.

Against this background, the present research project would aim at testing the psychometric properties and measurement models of advanced versions of the IGT and SST in large (N>300) normative samples of

community-dwelling adolescents and adults. Up to now, data on 300 community-dwelling adults have been already collected. The <u>first year</u> of the PhD program, will be devoted to the collection of adolescent data and to the implementation of different SSRT/IGT advanced modeling methods. During the <u>second year</u>, the focus will be on to the evaluation of the assessment of the reliability and convergent/discriminant validity of the IGT and SST with respect to the go-no go task, CPT memory and verbal fluency tasks in the adult sample. Finally, the <u>third year</u> would be devoted to the comparison of SSRT/IGT advanced modeling methods across adolescents and adults in terms of reliability and validity.

Competenze che deve acquisire lo studente/Skills to be acquired by the student (Max 600 caratteri spazi inclusi/ *Number of characters*, *including spaces*: max 600):

Administering and scoring neuropsychological tasks for the assessment of impulsivity

Design of studies for assessing the psychometric properties of neuropsychological tasks

Measurement modelling for impulsivity assessment

Multivariate statistical analyses

Sample size estimation and power analysis for multivariate studies. Randomization procedures Experimental designs for psychometrics

Advanced reliability theory

Statistical software for advanced psychometric analysis and laboratory task development and administration (R, Mplus, Matlab)

Bibliografia/References (max. 15)

Ahn, W.-Y., Busemeyer, J. R., Wagenmakers, E.-J., & Stout, J. C. (2008). Comparison of decision learning models using the generalization criterion method. Cognitive Science, 32 , 1376 - 1402.

Boehler, C. N., Appelbaum, L. G., Krebs, R. M., Hopf, J. M., & Woldorff, M. G. (2012). The influence of different Stop-signal response time estimation procedures on behavior–behavior and brain– behavior correlations. Behavioural Brain Research, 229, 123-130.

Busemeyer JR, Stout J, Finn P (2003). Using computational models to help explain decision making processes of substance abusers. In Cognitive and affective neuroscience of psychopathology, Barch D (ed) pp 1-41. New York, NY: Oxford University Press.

Heathcote, A., Lin, Y. S., Reynolds, A., Strickland, L., Gretton, M., & Matzke, D. (2019). Dynamic models of choice. *Behavior Research Methods*, *51*, 961-985.

Hedge, C., Powell, G., & Sumner, P. (2018). The reliability paradox: Why robust cognitive tasks do not produce reliable individual differences. *Behavior Research Methods*, *50*, 1166-1186.

Jonas, K. G., & Markon, K. E. (2014). A meta-analytic evaluation of the endophenotype hypothesis: Effects of measurement paradigm in the psychiatric genetics of impulsivity. Journal of Abnormal Psychology, 123, 660-675.

Matzke, D., Curley, S., Gong, C. Q., & Heathcote, A. (2019). Inhibiting responses to difficult choices. Journal of Experimental Psychology: General, 148(1), 124-142.

Matzke, D., Hughes, M., Badcock, J. C., Michie, P., & Heathcote, A. (2017). Failures of cognitive control or attention? The case of stop-signal deficits in schizophrenia. *Attention, Perception, & Psychophysics*, *79*, 1078-1086.

Skippen, P., Fulham, W. R., Michie, P. T., Matzke, D., Heathcote, A., & Karayanidis, F. (2020). Reconsidering electrophysiological markers of response inhibition in light of trigger failures in the stop-signal task. *Psychophysiology*, *57*(10), e13619.

Skippen, P., Matzke, D., Heathcote, A., Fulham, W. R., Michie, P., & Karayanidis, F. (2019). Reliability of triggering inhibitory process is a better predictor of impulsivity than SSRT. *Acta Psychologica, 192,* 104–117.

Steingroever, H., Pachur, T., Šmíra, M., & Lee, M. D. (2017). Bayesian techniques for analyzing group differences in the Iowa Gambling Task: A case study of intuitive and deliberate decision-makers. Psychonomic Bulletin & Review, 1-20.