

The chicken or the egg? - An investigation of cognitive and non-cognitive impairments in schizophrenia under the light of goal-directed behaviours

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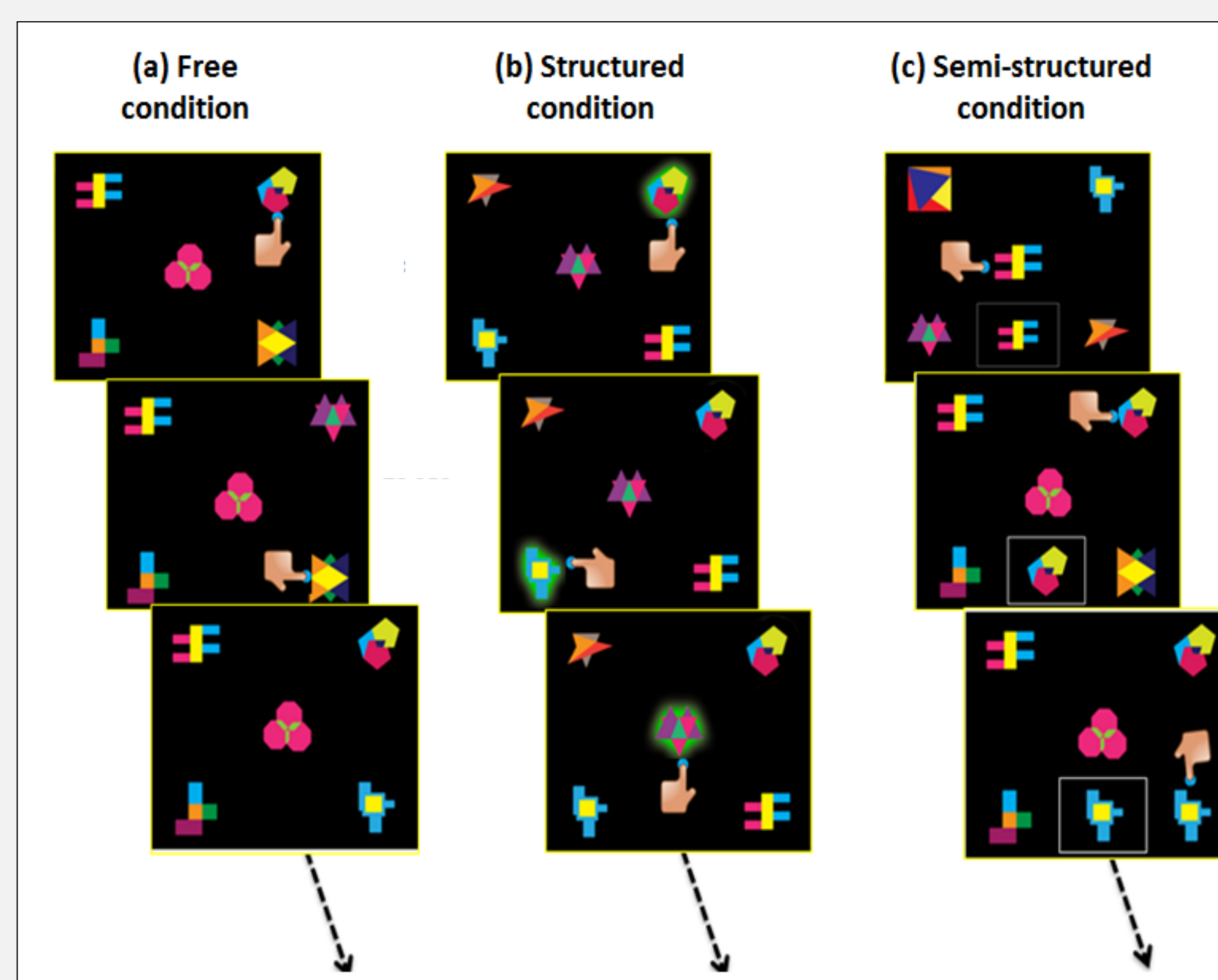
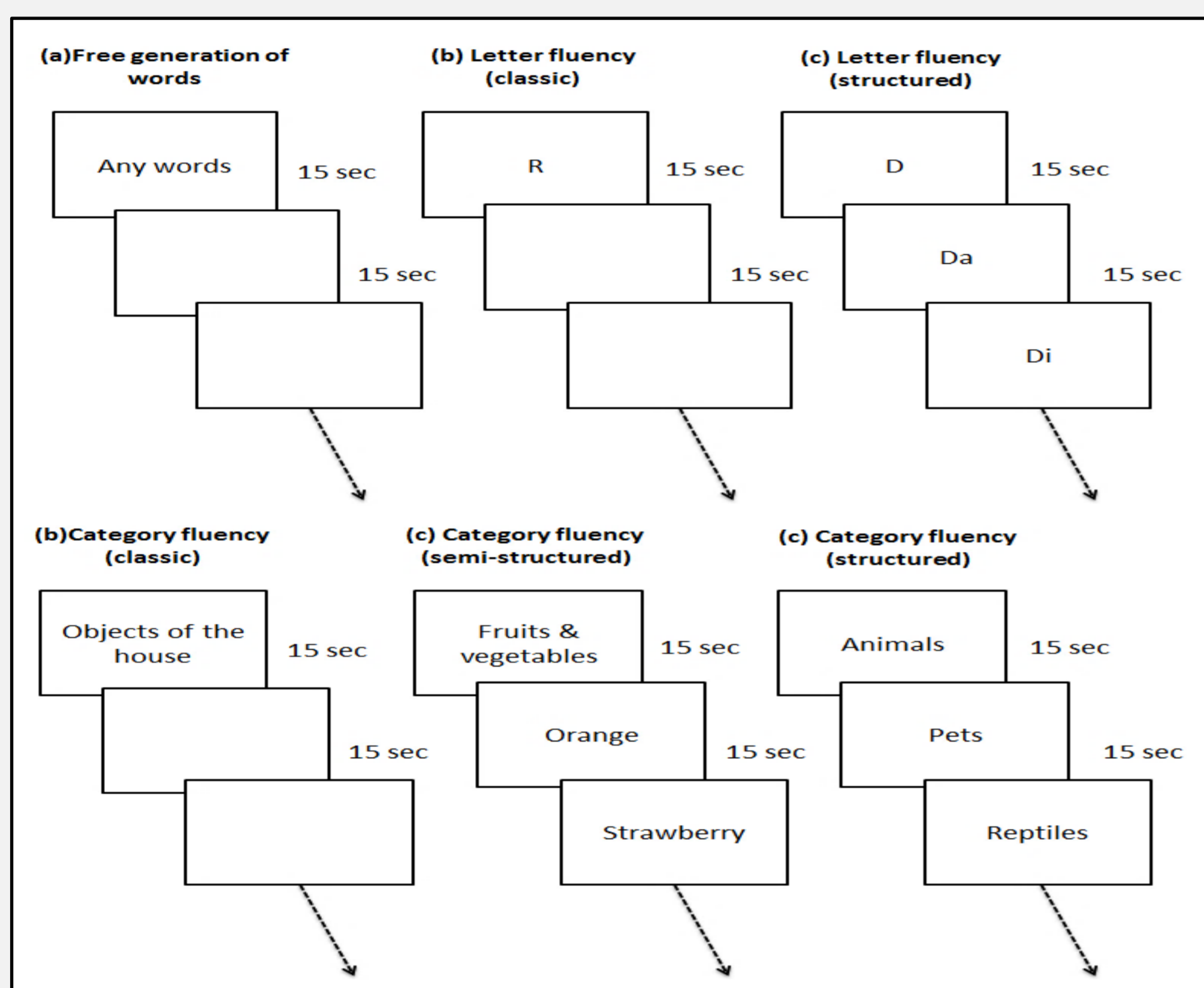
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Background: Goal-directed actions refer to behaviours that are formulated following a given objective **by building a plan and selecting actions**. These actions should lead to the attended issue (goal) either immediately or within a longer period. This type of actions is an important **unit of analysis** in the study of human behaviour because it is involved in **most of the complex or novel situations** a subject may encounter. Within this type of behaviour **context processing** has a specific interest because its involvement **at each step of the decisional processes** of goal-directed actions; namely the “if/whether” (should I start this action?), the “what” (selection of the action and the strategies) and the “when” (should I start this action right now?) [1]. Context is then defined as **every information or environmental element that precedes a given response** and consequently, should have a certain influence on it [2].

Method:

Participants

36 experimental subjects (20 in- & 16 outpatients) meeting the DSM-V criteria for schizophrenia with no vascular, neurological or other psychiatric past histories and **26 control subjects** matched in terms of age, gender and schooling with no neurological or vascular past history nor present mental disease.



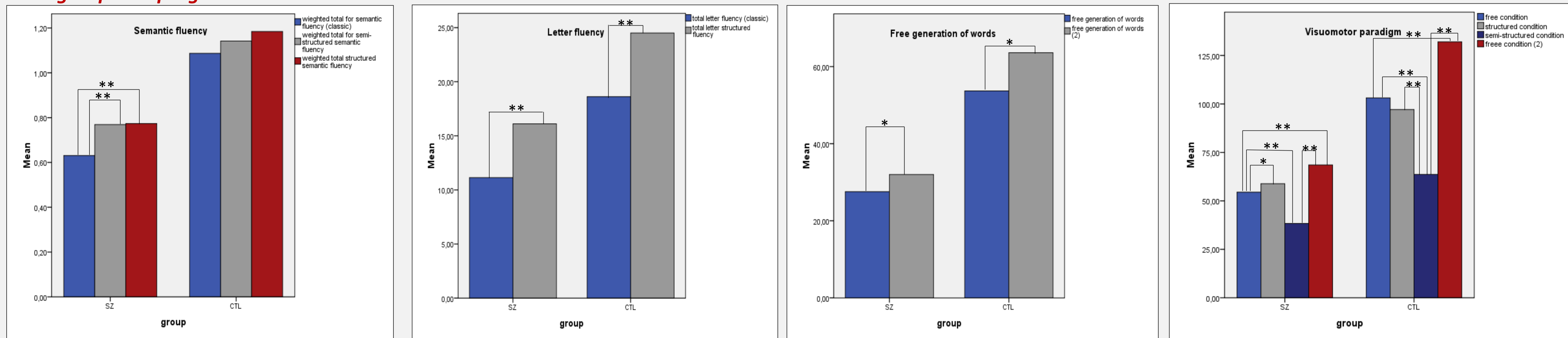
Material and procedure

We sought to investigate performance evolution in a cognitive (**verbal fluency**) and a “non-cognitive” (**visuomotor**) paradigm regarding to the **introduction of contextual cues and constraints**. Each (sub)task is built on the same principle with (1) **a minimal context of response (free version)**, (2) **a more or less structured one (structured or semi-structured versions)** and (3) **a last free version** in which **subjects are required to perform “as fast as they can”**.

Patients were assessed with a clinical (PANSS, BPRS, Lille Apathy Rating Scale) and a neurocognitive battery (TAP’ mental flexibility, attentional shifting, inhibition and sustained attention subtests and WAIS verbal IQ). Controls were assessed with the same neurocognitive battery and completed the Mini International Neuropsychiatric Interview in order to search for past or present axis I elements.

Results

Intragroup task progression



** $p < 0.01$, * $p < 0.05$

Intergroup analyses

- Patients perform **significantly more poorly for all the fluency totals**.
- They make significantly **smaller clusters** and **include less words** in those clusters (strategic adaptation index) **except for letter fluency**.
- They also **hit less targets** for each condition of the visuomotor paradigm and are **slower** in terms of motor and reasoning processes.
- The benefits are **independent from the baseline performance but also from the psychomotor slowing** in each task and subtask.

Task x condition x group overall analysis

	When strategy is obvious (<i>spontaneously found</i>)	When strategy is not obvious (<i>not spontaneously found*/when no strategy would improve the performances</i>)
Cognitive /complex task	<p><u>Semantic fluency (++)</u> Patients significantly improve Controls improve (not significant)</p> <p><u>Free generation of words (+)</u> Patients and controls significantly improve but controls show greater improvements</p> <p>Planning strategies** do not improve</p> <p>>> positive dimension and mental flexibility in patients</p>	<p><u>Letter fluency</u> Patients and control significantly and equally improve</p> <p>Planning strategies also improve</p> <p>Independently from any clinical or cognitive variables</p>
Visuomotor/simple task		<p><u>Visuomotor paradigm</u> Patients and controls significantly improve but controls show greater improvements</p> <p>>> negative dimension in patients</p>

(*) Cluster mean close or equal to 0 in both groups
(**) Planning strategies= optimal use of clusters and switches → large or numerous clusters and cluster switches rather than hard switches.
(++) more clusters found in both groups compared to the letter fluency
(+-) more clusters found in both groups compared to the letter fluency but did not reach the significance level

Discussion

Results show that, if in any cases, patients with schizophrenia are likely to benefit from contextual cueing; this benefit might not be equivalent depending on the type of task or planning load it involves (regardless of contextual constraints). In particular, regarding these variables, the predictions made by Frith (1992) [3] might not be as sharp as they were originally defined (namely: lack of initiation for the negative dimension and lack of inhibition of stimulus-driven actions for the positive dimension). Completion of the experimental sample (50 SZ & 50 CTL) and further investigations on the specific nature of the cues are already in progress.

[1] Haggard, P. (2008). Human volition: towards a neuroscience of will. *Nature Reviews. Neuroscience*, 9(12), 934–467
[2] Servan-Schreiber, D., Cohen, J. D., & Steingard, S. (1997). Schizophrenic deficits in the processing of context: A test of a theoretical model. *Archives of General Psychiatry*, 53, 1105–1112.
[3] Frith, C. D. (1992). *The Cognitive Neuropsychology of Schizophrenia* (Psychology, p. 184). London.