### Paper Session:

**PIAAC skills assessment**

**Chair**

*Anouk Zabal (GESIS – Leibniz-Institute for the Social Sciences, Germany)*

**Presentations**

1. **Title:** The impact of text characteristics on gender differences in adults’ literacy skills.  
   **Authors:** Ai Miyamoto *(University of Freiburg, Germany)*, Britta Gauly & Anouk Zabal *(GESIS – Leibniz-Institute for the Social Sciences, Germany)*

2. **Title:** Statistical literacy assessment – necessity and framework.  
   **Author:** Tanja Ihden *(IMC University of Applied Sciences Krems, Austria)*

3. **Title:** What makes mathematics difficult for adults? The role of reading components in solving math items.  
   **Authors:** Nadine Cruz Neri, Jenny Wagner, & Jan Retelsdorf *(University of Hamburg, Germany)*

4. **Title:** PIAAC’s Survey of Adult Skills and low literacy / functional illiteracy.  
   **Authors:** Aleksandar Bulajić *(University of Kaiserslautern, Germany; University of Belgrade, Serbia)*, Réka Vágvölgyi *(University of Kaiserslautern, Germany)*, Kirstin Bergström *(University of Kaiserslautern, Germany)* & Thomas Lachmann *(University of Kaiserslautern, Germany)*
1. The impact of text characteristics on gender differences in adults' literacy skills.

Authors
Ai Miyamoto (University of Freiburg, Germany), Britta Gauly & Anouk Zabal (GESIS – Leibniz-Institute for the Social Sciences, Germany)

Presenter
Ai Miyamoto (University of Freiburg, Germany)

Abstract
Empirical evidence suggests gender differences in literacy skills in favor of girls during adolescence. However, whether these gender differences continue to exist during adulthood is still a topic of discussion. Previous studies found only a small to non-existent gender differences in adults' literacy skills. Moreover, some studies on school students suggest that the extent to which female and male students differ in their literacy skills also depend on text characteristics. For example, as females tend to read more during leisure time, which typically includes prose and continuous texts, they score better on those. However, so far, only a few studies have examined the role of text characteristics in gender differences in literacy skills among adults, and those findings are still inconclusive. In this study, we use data from the German sample of the Programme for the International Assessment of Adult Competencies (PIAAC) in 2012 and investigate the impact of three different types of text characteristics on gender differences in adults' literacy skills: text format, text topics, and the gender typicality of text. Because not all participants in PIAAC worked on literacy items, we focus on data from a subsample of individuals who worked on the same set of literacy items with two levels of text difficulty (medium difficulty and high difficulty). That left us with 2,080 adults in total (50% female) between 16 and 65 years of age. We used logistic regressions with performance on the literacy items (binary indicator: correct versus incorrect/no response) as the dependent variable while also taking into account participants' age, education, and cultural capital. Our first preliminary results revealed that females tend to show lower literacy scores for non-continuous and mixed texts than males, whereas there were no gender differences for continuous texts and females tend to have lower literacy scores for texts with male-typical content compared to males. Our findings bring first insights into the variability of gender differences in literacy skills across different text characteristics.

**Author (Presenter)**
Tanja Ihden *(IMC University of Applied Sciences Krems, Austria)*

**Abstract**
While the need for statistical literacy of the population is no longer in doubt, the next step is to ascertain a status quo. After election campaigns during Brexit, political discussions about the crime of refugees or the handling of statistical indicators in the context of the corona crisis suggest deficits in dealing with basic statistical competencies, the hypothesis of a poor statistical literacy of the population should be tested empirically. While tests on statistical literacy are already being developed and used by students, there is a lack of comparable instruments for recording basic statistical competencies of the general population, which is increasingly confronted with statistical statements in their everyday life and has to derive a variety of different decisions from them. There are already initial attempts to record the statistical literacy of a population, but a coordinated approach seems necessary. A uniform definition of the term statistical literacy as well as a framework are necessary and will be discussed here.
3. What makes mathematics difficult for adults? The role of reading components in solving math items.

Authors
Nadine Cruz Neri, Jenny Wagner, & Jan Retelsdorf (University of Hamburg, Germany)

Presenter
Nadine Cruz Neri (University of Hamburg, Germany)

Abstract
Theoretical and empirical background: While mathematics become more important in modern societies, all countries participating in the PIAAC study have a considerable number of adults with mathematical deficits. Although it is theoretically and empirically known that reading comprehension plays a significant role in mathematics performance, it remains unclear how specific reading components skills and item characteristics are associated with adults' mathematics performance. Investigating the interaction effects of reading components and item characteristics beyond the school context may be crucial to understand why a considerable number of adults show deficits in their reading and mathematical skills. Aims: The aim of this study was to investigate (1) reading components skills (printed vocabulary, sentence processing, passage comprehension), (2) characteristics of mathematics items (picture/table, complex verbs, number of prepositions, lexical density), and (3) possible interaction effects thereof on adults' mathematics performance, (4) while controlling for adults' gender and migratory background. Methods: The sample stem from German participants of PIAAC and consisted of 368 German adults (age: M = 50.45; 59% female). Reliabilities for the measurements ranged from .86 to .98. To test the hypotheses, we applied three logistic multilevel models for each reading component, respectively. Results: First, our results showed positive main effects of adults' reading components skills on performance. Second, while participants showed higher performance on mathematics items presented with an informational picture or an assistance-providing table, the use of complex verbs was linked to lower performance. Furthermore, lower mathematics performance was associated with an increasing number of prepositions and lexical density in the items. Third, most existing interaction effects of sentence processing and passage comprehension with item characteristics on mathematics performance did not hold when controlling for gender and migratory background. Regarding the model with passage comprehension, participants with higher passage comprehension scored significantly lower on items with an increasing number of prepositions, while scoring significantly higher on items with increasing lexical density. Discussion: Implications to support adults with low reading skills may include enhancing their reading component skills and adapting mathematics items by reducing linguistic complexity.

Authors
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Presenter
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Abstract
From the beginning of the second half of the 20th century, the concept of literacy underwent significant changes. Officially introduced as a global issue at the UNESCO's Conference in Tehran in 1946, literacy began to be understood in a wider socio-economic context. Functional illiteracy (FI) as a new concept introduced by UNESCO (1978), was spurred by the growing needs of industrial progress and in recognition of the inadequacy of basic education to provide an adequate level of literacy skills needed for accelerated socio-economic development (Bulajić et al., 2019). "Rediscovering" of illiteracy in industrialized countries (Goffinet & Damme, 1990, p. 4), as a form of skill and wider societal incompetence, led to the need to operationalise the meaning of functionality and address it at the cognitive, policy and educational level. After UNESCO proposed a more operational distinction between primary and functional illiteracy, an increasing number of research including large-scale studies (e.g. German Level-One Study [Grotlüschen et al., 2020]) started examining FI or low literacy (a more contemporary term) from a cognitive, neuropsychological, educational (e.g. ABE) and policy level. PIAAC's Survey of Adult Skills (SAS) assesses literacy skills on a 500 point scale divided on the 6 proficiency levels corresponding to particular point ranges (OECD, 2019). The authors of the proposed manuscript/presentation draw on the methods and results of a number of previous experimental cognitive/neuropsychological, as well as large-scale studies, to argue that SAS' Literacy Level 1 (OECD, 2019) corresponds to FI. A number of categorical arguments based on most recent operational definitions (e.g. Bulajić et al., 2019; Vágvölgyi et al., 2016; Vágvölgyi et al., 2021), as well as quantitative-based comparisons between SAS and other large-scale studies are offered. In order to confirm and further develop diagnostic precision of SAS for the determining of the level of functional illiteracy and low literacy, the authors address several possible adjustments in SAS and offer their perspective on adapting the testing methodology and content (e.g. adding short phonological awareness tasks) for SAS for this purpose. Key words: functional illiteracy, low literacy, Survey of Adult Skills, literacy testing.