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Individual differences fill the uncharted intersections between cognitive structure, flexibility and plasticity in multitasking

Little more than a decade ago, a study by Watson and Strayer (2010) brought forward the concept of supertaskers, because 5 of the 200 participants tested had the remarkable ability to perform a driving task and an operation span task without any costs. This outcome, which accentuates the potential impact of individual differences on multitasking, caused a stir in dual-task research by challenging previous assumptions about the cognitive architecture and the robust empirical evidence about limited cognitive resources and imperfect time-sharing (Kahneman, 1973; Tombu & Jolicœur, 2003; Wickens, 2002). Adhering to the common assumption that multiple tasks cannot be performed without interference or costs, dual-task research had primarily focused on discovering and explaining the mechanisms underlying limitations in information processing (Meyer & Kieras, 1997; Wickens, 1980). As a result, researchers have been very successful in developing distinguished paradigms and establishing differentiated theories on dual-task and task-switching costs valid across multiple studies on human participants (Koch et al., 2018). It has been suggested that this work is best organized according to three research perspectives, which differ in their focus on cognitive structure, flexibility, and plasticity (for the full review see Koch et al., 2018). In their review, Koch et al. mention that there might be some relations between the three perspectives and that they should be seen as complementary rather than competitive in the sense that they refer "either to the current status of the cognitive system (structure, flexibility) or its dynamic change (plasticity)" (p. 558). However, the review remains short on explicitly describing or explaining the intersections between the three perspectives. The overall goal of this theoretical note is to show that the explicit consideration of individual differences is one possible way to elaborate in more detail on how and why the perspectives complement each other, that is, why the consideration of individual differences in one perspective can enhance the understanding of the other perspective. Whereas most established work on multitasking has been derived from group means, we posit that too little emphasis has been put on variability between and within participants (see also the requirement for nomothetic instead of Aristotelian view; e.g., Hommel & Colzato, 2017). To remedy this state, we will first define structure, flexibility and plasticity and describe what constitutes individual differences in these three perspectives. We will then outline selected empirical results on the intersections, without claiming to be exhaustive, and raise possible future research questions and directions.

Structure, Flexibility and Plasticity

Cognitive structure refers to invariable properties and limitations of the cognitive architecture, which operate as hardware and make up restrictions for multitasking performance. Inter-individual differences in hardware can concern capacity, which would be differences in attentional resources or working memory capacity (Oberauer, 2019; Szameitat et al., 2016; for opposing views see Hommel, 2020; Meyer & Kieras, 1997). Inter-individual differences in cognitive structure also relate to skills in executive mechanisms (Miyake et al., 2000; Pashler, 1994; but see Sigman & Dehaene, 2006) and/or to skills in basic processes involved in, for instance, perception, decision and motor responding during task processing. With a focus on multitasking, variance in structure creates the basis for different manifestations of multitasking performance and related costs. In that respect, dual-task costs can be considered as resulting from insufficient attentional resources and/or the (in)ability to inhibit interfering tasks or stimuli acting together with basic processes prone to interference from other tasks (Garner et al., 2021).

Flexibility refers to the organization of cognitive processes; it manifests in different strategies when dealing with multiple tasks and reflects the degree of adaptability of the cognitive system to face new and unexpected/changing conditions in the environment. Referring to a computer metaphor, flexible process organization would represent the software running on the cognitive structure as the hardware components, both contributing to the emergence of dual-task costs.

Differences can thus be identified between individuals, for instance when people pursue different strategies in response order or serial versus overlapping processing (e.g., Brüning et al., 2020, 2021; Lehle et al., 2009; Meyer et al., 1995; Reissland & Manzey, 2016) as well as within individuals, for instance when being instructed to coordinate response order according to different experimental conditions (e.g., Kübler et al., 2018; Lague-Beauvais et al., 2015).

Plasticity refers to long-term potential for change in performance due to experience (e.g., training or other long-lasting cognitive challenges) or ageing.

As outlined earlier, the three perspectives are not competitive and can be dependent. For instance, flexibility can be viewed as the result or manifestation of differences in hardware. Further, flexibility can be viewed as a determinant governing how control mechanisms are reinforced and eventually influencing manifestations of plasticity in the long run. In the following we will show why and how individual differences can inform the dependencies between the three perspectives.

Filling the intersections between cognitive structure – flexibility – plasticity

We propose that we will be better able to understand inter-individual differences in multitasking if they were not only considered from one, but from the intersection of two or all three perspectives. For instance, variability in flexibility could depend on variability in structure if certain resources determine whether and to which extent cognitive processes can be flexibly organized or they are vulnerable to interference from other processes. Thus, differences in hardware like working memory capacity would explain why individuals differ in their efficiency to organize their processes (i.e. their software), for instance, in the speed of task-set reconfiguration (Draheim et al., 2016; Pettigrew & Martin, 2016; but see Liefooghe et al., 2008), in their ability of scheduling responses (e.g., Kübler et al., 2019) or in shielding vs. shifting (e.g., Zwosta et al., 2013). Likewise, variability in plasticity could emerge from variability in structure. The extent to which the cognitive architecture is malleable would thus determine how much improvement occurs with multitasking training (Garner & Dux, 2015). Eventually, differences in plasticity can depend on flexibility considering that multitasking strategies change throughout development with typically less flexible strategies at older age (e.g., Bherer et al., 2005). Further, strategies may change with the level of experience with a task (Schubert & Strobach, 2018; Stoet & Snyder, 2003), although it is unclear whether more experience allows for more flexible strategies or promotes trusted and established strategies. In the other direction, dynamic experience-dependent change itself might depend on the individual's ability or motivation to adapt to different situations ("trainability", e.g., Strobach et al., 2015). We will exemplify these proposals in further detail below. Reviewing the current state-of-the-art research has revealed an imbalance in the quantity of empirical evidence on the different intersections. While there is ample evidence for a bidirectional interdependency between structure and flexibility, less is known about the intersection of structure and plasticity and even less for the intersection of flexibility and plasticity. Hence, we will first have a focus on the intersection of structure and flexibility.

Structure-Flexibility

Hints to important links of structure and flexibility have been provided in several multitasking studies, for example in task-switching and psychological refractory period (PRP) research. As we will outline in further detail below, most of these studies highlight the link between certain control mechanisms of the hardware (e.g., task-set reconfiguration, response selection) and flexibility, yet others highlight the link between constraints of the cognitive hardware like WMC and flexibility.

Experiments demonstrate that differences in flexibility, which amongst others are represented by an individual's decision to repeat or switch task sets, are also attributable to structural differences.

For instance, across multiple experiments, task switches were induced by increasing the waiting time for the repetition stimuli for each subsequent repetition trial (Mittelstädt et al., 2018, 2019; Monno et al., 2021). When correlating switch costs and switch rates across all experiments, the following result pattern emerged: participants with small switch costs switch tasks more often than participants with larger switch costs, especially with shorter time for task selection (see also Arrington & Logan, 2004). If smaller switch costs reflect higher skills in executive functioning, then this result would indicate that differences in process organization were directly impacted by differences in structure. Furthermore, there is evidence that despite basic capacities such as the human ability of processing multiple tasks in parallel, yet different processing strategies differing in their degree of flexibility can emerge. Brüning et al. (2021) identified individual preferences for serial versus overlapping (parallel) process organization in a, what they refer to as, task-switching-with-preview paradigm. More specifically, participants had to classify a set of digits regarding their parity (odd vs. even), and a set of letters regarding their kind of sound (consonant vs. vowel), while receiving a preview about upcoming stimuli. Whereas some participants made use of the opportunity of parallel processing ("overlapping processing") others apparently separated tasks as much as possible ("serial processing"). These two modes of task processing, thus, can be seen as flexible approaches to deal with a structural limitation. Furthermore, Brüning and Manzey (2018) could show that individuals differ in the degree to which they are able to adapt their preferred mode of processing to the level of risk for interference. The authors compared the modes of task processing participants preferred under conditions of low risk for interference (i.e., involving digit and letter stimuli) and under high risk for interference (i.e., involving two sets of letter stimuli). The modes of processing were identified in each condition of interference by a comparison of mixing and switch costs in reaction times (RTs). Mixing costs are defined as the difference in RTs between repetition and single-task trials and switch costs reflect the difference in RTs between switch and repetition trials. The authors hypothesized that switch trials comprise the processing time for the task stimulus plus additional time for a task-set reconfiguration and/or task-inertia. If participants processed serially, RTs in switch trials should reflect some switch costs as they shift from one task-set to the other just in the switch trial. In contrast, if switch RTs in the preview group were faster than the typical RTs in single-task trials (along with no increase of mixing costs in repetition and pre-switch trials), this was to "be taken as evidence that at least some processing of the previewed switch stimulus must have taken place before the switch and, thus, reduced the switch costs to a considerable degree" (p. 98, see also Brüning et al., 2021 for an in-depth description of the classification criteria). All participants who prefer serial processing in conditions of low risk for interference used this mode also in conditions of high risk for interference. However, most of the participants preferring an overlapping processing mode when the risk for task interference was low shifted to a more serial processing mode in the condition where risk for task interference was high.

Just as some individuals are able to lower switch costs in task-switching paradigms, several individuals have been shown to eliminate the PRP effect in dual-task paradigms (Maquestiaux et al., 2008, 2018; Ruthruff, Van Selst, et al., 2006; Schumacher et al., 2001). It seems that executive functions contribute to the flexible regulation of task-order in dual tasks (Kübler et al., 2019; Schubert, 2008; Steinhauser et al., 2021). This eventually leads to a reduction of dual-task interference or even a bypassing of the bottleneck - regardless of the stage at which it is located (Ruthruff, Hazeltine, et al., 2006; Schubert, 2008). Individual differences in the PRP effect therefore cannot exclusively be attributed to the extent to which a bottleneck does or does not exist, but the flexibility of efficiently using control mechanisms in a top-down manner, which means efficiently deploying the software (Lague-Beauvais et al., 2013; Maquestiaux et al., 2008). In this regard, Kübler et al. (2018) showed that participants who relied on their own task-order choice decisions showed better performance (i.e., lower dual-task costs) compared to participants who adjusted their task order to an external, mandatory order criterion. While this indicates that the requirement to adhere to externally- compared to internally-determined processing demands can lead to increasing dual-task costs, the mechanism of task-order regulation by itself requires sufficient WMC. This was shown by Kübler et al. (2021) who showed that the difference in dual-task costs between situations of changing vs. non-changing task orders disappears under conditions of increased working memory load during task-order regulation.

Proper investigation of flexibility (and its relation to structure or plasticity) calls for the use of appropriate experimental paradigms, which release experimental control and allow for more freedom in task choice and in processing order between situations. This is also evident in situations with more complex multitasking scenarios (e.g., SynWin paradigm, Elsmore & McBride, 1994; multitimer paradigm, Frick et al., 2021; counter task, Mäntylä, 2013) demanding from participants to process and switch between several tasks within a limited time frame (Logie et al., 2011; Oswald et al., 2007). With the aim of circumventing bottlenecks, participants vary in their multitasking strategies and show pronounced inter-individual differences in the temporal monitoring and coordination of multiple tasks (e.g., Kubik et al., 2020; Todorov et al., 2018).

Irrespective of considering task-switching or dual-task paradigms, it seems important to discuss that whether or not flexibility makes a major contribution to task choice may depend on the measure of performance. Many studies, like the studies by Kübler et al. (2018) as well as Brüning and Manzey (2018, 2021) mentioned here, infer differences in reaction times to differences in flexibility among individuals. Reaction times are a typical measure of shifting and it has been suggested that "it is indeed easy to consider cognitive flexibility and shifting as one and the same because if we decompose any flexible behaviour, we will find shifting to be an important component of it" (Ionescu, 2012, p.193). Reaction times and/or costs might however not always be a sufficient indicator of flexibility, because flexibility can be understood as both a specific ability as well as a property of different cognitive processes. Considering several mechanisms in the study of cognitive flexibility in multitasking, which would include multiple measures and thus performance variables, would help to further understand individual differences in flexibility and should be implemented in the future (for further details on deductive vs. inductive measures of flexibility see Ionescu, 2012).

As outlined earlier, while these results represent relations between control mechanisms of the hardware and flexibility there is, interestingly, little evidence so far on the relationship between basic capacity constraints of the cognitive hardware and flexibility. Preliminary results suggest that working memory capacity (WMC) sets boundaries for the degree of adaptability to different tasks. For example, Kübler et al. (2021) showed that flexible task scheduling in dual-task situations relies heavily on WMC. Likewise, Brüning and Manzey (2018) found that individual preferences for overlapping versus serial processing are associated with differences in WMC. Specifically, individuals with higher WMC more often engaged in an overlapping processing mode and were more flexible to adapt to contexts for instance with higher risk of crosstalk (i.e., contexts with (content-based) code overlap between tasks; Koch, 2009). In the more complex multitasking paradigms, WMC also explained a substantial amount of inter-individual differences in multitasking performance (Hambrick et al., 2010; Redick et al., 2016; Todorov et al., 2018). Furthermore, there is evidence that beyond WMC and executive functions, visuo-spatial processing ability can be an important structural determinant for multitasking scenarios involving higher temporal demands of monitoring, coordinating, and choosing when to execute the individual tasks in time as compared to more experimentally controlled paradigms (Frick et al., 2021; Mäntylä, 2013). For example, Mäntylä et al. (2013; see also Kubik et al., 2020; Todorov et al., 2018) showed that spatial ability (as measured by mental rotation performance) was an independent predictor of multitasking performance beyond WMC. Furthermore, in situations demanding high temporal monitoring, gender-related differences in multitasking mainly reflected differences in spatial ability (Mäntylä, 2013; Mäntylä et al., 2017): men's better multitasking performance was mediated by individual differences in spatial ability, but not in executive functions. These results support the spatiotemporal hypothesis (cf. Mäntylä, 2013) which proposes that multitasking involves the representation of temporal deadlines in spatial terms and thus that everyday multitasking can be alleviated by representing multiple tasks or deadlines in spatial terms.

Future research is required to determine how individual differences in software, other abilities within the cognitive architecture (e.g., processing speed, fluid intelligence, decision-making ability) as well as non-cognitive characteristics (e.g., preferences, personality dimensions) may account for different performance measures of multitasking (Broeker et al., 2018). A first step to establish more concrete relations between hardware and flexibility, and to increase data availability in this regard, could be to integrate more standardized measures of executive functioning into multitasking studies by default. This would also partly increase comparability between studies. However, it is to be avoided to artificially inflate designs to not violate utility and reasonableness.

In addition to Kübler et al. (2021), Brüning et al. (2020) postulate that response strategies cannot be exclusively explained by soft- or hardware, or context. They argue that people tend to prefer and rigidly follow an approach that is consistently characterised by *either* frequent switches (requiring high degrees of flexibility for frequent reconfiguration) *or* blocked responses (requiring lower degrees of flexibility due to higher separation of task sets). A concept that might explain why people tend to rigidly prefer either approach is the Metacontrol State model by Hommel (2015; see also Mekern et al., 2019). According to this model, individuals have a default mode to deal with multitasking requirements in a more flexible or in a more persistent manner. The preferences for response scheduling might therefore represent behavioural correlates of the coherent metacontrol default value. There is already some evidence showing that, for example, convergent thinking (Fischer & Hommel, 2012) or negative mood (Zwosta et al., 2013), which are both supposed to determine the parameters of cognitive control, can result in less crosstalk. However, the model needs further empirical support and to understand if metacontrol states explain individual differences in multitasking it has to be further clarified to which extent control states are considered trait biases vs. adaptive state biases (see Mekern et al., 2019). There is also scarce empirical support that other structural differences such as psychological characteristics (e.g., impulsivity, sustained attention) affect processing or response organization (Fröber & Dreisbach, 2016; Katidioti & Taatgen, 2014).

Beyond, we also find evidence for individual differences in flexibility affecting cognitive structure. For instance, some types of dual tasks allow task integration which eventually helps to reduce or even circumvent structural limitations (e.g., Broeker et al., 2020; de Oliveira et al., 2017). Participants who practiced a tracking task and an auditory response task, reduced costs in both tasks once the auditory task was tempo-spatially coupled to the tracking task (Broeker et al., 2021): Whenever the sounds of the auditory task did not occur in random intervals along the tracking path, but shortly before tracking turns, all participants improved tracking accuracy and reaction times. One possible explanation for this result is that the response organization changed the representation from "performing two separate tasks" to "performing one integrated task" (flexible strategy), thereby outsmarting structural constraints. However, as there was large inter-individual variance in the improvement on both and not only one task, not all participants seem to be equally able to adopt flexible strategies. Therefore, it remains unclear whether such strategies are subject to the particular skill levels of participants and whether individuals per se differ in flexibility, or whether strategies are subject to training and everyone can acquire flexible strategies sooner or later (plasticity perspective, see below).

Taken together, an individual difference perspective on the flexibility-structure intersection may improve our understanding of why individual differences in strategies (e.g., switching vs. blocking) or decisions (e.g., to switch or repeat) occur, and by which invariable properties or control mechanisms they are influenced. Besides, this perspective might inform our understanding of how individuals are able to efficiently deal with structural prerequisites to reduce or even circumvent cognitive limitations. Overall, the work done so far mostly focused on the link between individual differences in flexibility and control mechanisms. It provides accumulating evidence for individual differences in the use of multitasking strategies, which are more or less flexible. However, more research needs to be conducted on the relation between flexibility and the basic constraints of the hardware as well as on the question how individual differences in flexibility might affect cognitive structures. Such a new focus could also contribute to rethinking classic theoretical approaches and related discourses, for instance, whether bottlenecks are structural or strategic in nature (e.g., Han & Marois, 2013; Ruthruff et al., 2009).

Structure-Plasticity and Flexibility-Plasticity

Several lines of research indicate that individual differences in hardware (e.g., in WMC) potentially contribute to differences in plasticity. First, evidence from age-comparative studies can speak to the structure-plasticity intersection as children and older adult groups typically show larger switch and mixing costs, and lower WMC relative to younger adults. Accordingly, studies have demonstrated pronounced age differences in training benefits with some studies showing that children and older adults benefit more from task-switching training than younger adults, while others demonstrated greater training benefits in younger adults (Cepeda et al., 2001; Karbach & Kray, 2009). Yet other studies demonstrated equivalent improvement in dual tasks across age groups when using the so-called "testing-the-limits"-approach (Bherer et al., 2006; Kliegl & Baltes, 1991). This approach highlights the need to consider different aspects of performance in order to avoid the overestimation of individual differences in unpractised or non-optimized testing conditions. These performance aspects include a baseline level of cognitive performance, the baseline reserve in optimized conditions (i.e., "current maximum potential of cognitive performance", p. 263) and eventually the developmental reserve, or the maximum latent potential of an individual after training (Bherer et al., 2006). Taken together, these findings indicate that differences in structural limitations due to age may affect training benefits (Bherer et al., 2005; Lussier et al., 2015; Sabah et al., 2019) and that a more individualised approach is necessary to understand the impact of structure on plasticity in multitasking. Second, one study that directly examined individual differences in a lifespan sample (after controlling for age) demonstrated that training benefits were higher for individuals who showed higher switch costs and lower working memory at pre-test (Karbach et al., 2017). These results are in line with the compensation (vs. magnification) hypothesis (e.g., Lövdén et al., 2012), suggesting that individuals starting out with lower structural prerequisites benefit more from training. Other training studies have also provided evidence consistent with magnification effects such that individuals with higher structural prerequisites benefit more from training (e.g., Foster et al., 2017; Strobach et al., 2012; Strobach & Huestegge, 2017). While evidence with respect to the compensation vs. magnification of individual differences with training is mixed (Laube et al., 2020; Traut et al., 2021), these studies strengthen our claim that inter-individual differences in structure affect plasticity and point to the need to investigate this interaction in future work. Second, to the degree to which neural structures (i.e., brain structure and function measured in-vivo with MRI) are considered to relate to cognitive structures, one study demonstrated that the volume of the left dorsolateral prefrontal cortex predicted an individual's response to dual-task training in healthy adults (Verghese et al., 2016). In another study, a group undergoing dual n-back training (as compared to single n-back training) showed improved performance accompanied by increased functional connectivity of the ventral default mode network in the right inferior frontal gyrus, which correlated with improvements in working memory performance (Salminen et al., 2016, 2020). To date, these correlational results do not allow to ascertain the extent to which hardware limitations (e.g., WMC) are causing multitasking improvements or may reflect a common underlying component. Here, training studies may provide valuable insight in the future by examining whether and how training-related improvements in WMC leads to better multitasking performance when compared to a direct training of multitasking. Incorporating neurophysiological measures in such designs may further help disentangle direct effects of structural/hardware limitations from common underlying components.

Considering the potential contributions of individual differences in plasticity on structure, there is evidence that participants experiencing different degrees of practice exhibit different levels of cost reduction (Schumacher et al., 2001; Van Selst et al., 1999). For instance, Schumacher and colleagues showed that after relatively modest amounts of practice, some participants achieved virtually perfect time sharing in dual-tasks. These results suggest that variability in plasticity contributes to variability in the minimization of the rigidity of cognitive structures.

To date, only a handful of studies have examined the potential link between flexibility and plasticity. For example, one training study with children compared a group that practiced various tasks (including task switching and other executive functioning tasks) to a group of children who additionally received metacognitive scaffolding on detecting relevant features and using effective strategies to perform the tasks (Pozuelos et al., 2019). The results indicated greater training benefits in the metacognitive scaffolding group, providing indirect evidence for a potential link between flexibility and plasticity such that individual differences in response strategies may contribute to individuals' potential to benefit from multitasking training (cf. Fandakova et al., 2012).

Future research should also critically address the potential interaction between all three perspectives, in particular with regard to the variability of capacities/control mechanisms (i.e., hardware) and flexible strategies across the lifespan. One question includes whether children that adopt flexible processing strategies early also develop cognitive structures that allow more parallel processing later. Alternatively, can flexible processing strategies alleviate age-related declines in structure in later adulthood? For instance, individuals grown up bilingually from birth and who switch back and forth between languages often, have been measured to actually have better executive functions in adolescence and young adulthood (Bialystok, 2015; Gold et al., 2013; but see Lowe et al., 2021). If executive functions are part of the structure, then this would indicate that training flexibility could lead to changes in the structure. Such a new focus could also be extended to possible transfer effects. If a flexibility training and the coherent individual responsiveness can fundamentally change structure, can we expect transfer effects to other tasks? A series of studies (Schubert et al., 2017; Strobach et al.,

2015) showed that task coordination in dual-task situations is subject to training-related changes, which are even transferable to other new task situations and this ability to training and transfer is preserved even to older subjects though to lesser degree in the latter compared to younger subjects.

Taken together, an individual difference perspective on the structure-plasticity intersection can be especially informative with respect to understanding how different types of training may be more or less beneficial across individuals depending on their structural limitations. In addition, examining individual differences in the plasticity-flexibility intersection can be informative with respect to understanding why some people show considerable improvements after training in practiced and in novel transfer tasks. It is possible that individual differences in training gains may be related to individual differences in strategies (e.g., switching vs. blocking) or decisions (e.g., switch or repeat) during training. Integrating individual differences in strategies with WMC in future training studies applying the “testing-the-limits”-approach is promising for uncovering how structure and flexibility interact to facilitate or restrict the potential for lasting change in multitasking ability.

Overall, the plasticity perspective involves the greatest potential for the development of the field, because it may solve open questions in the structure-flexibility intersection. For instance, structural differences might develop through inefficient multitasking strategies that individuals had followed over a long time even though they had not benefited from them. To the best of our knowledge, no training studies have examined the extent to which strategies can be changed, leading to long-term structural benefits (i.e., higher working memory capacity).

Conclusion and outlook

Little more than a decade ago, Watson and Strayer (2010) claimed that an individual-differences perspective would “significantly improve our theoretical understanding of attention and performance in both traditional laboratory settings and more applied contexts” (p.484). Surprisingly few studies have followed this claim the past 10 years, although most studies show that individuals react differently to tasks and demands, and that individual differences in e.g. age, processing mode or dual-task costs beyond group averages deserve attention. Still, mostly group means are reported and even though standard deviations are reported, too, not much value is attached to them. As studies by Brüning and Manzey (2020, 2021), as well as many others show, particular data patterns pointing to individual differences, or even extraordinary multitasking abilities, do not only become apparent in very large samples but with comparably smaller samples. Classic multitasking paradigms including a sufficient number of trials are theoretically suited to detect and further examine variance without violating statistical power, thus following the general trend towards big data sets might not always be required (but see Hedge et al., 2018 for counter arguments; see LeBel et al., 2017, for alternative considerations regarding sample sizes).

We recommend the specific comparison of strongly controlled paradigms against modified versions in which some control is systematically relinquished (e.g., in only one specific task characteristic) to make it more likely to find (relevant) individual differences. As we have tried to convey with this theoretical note, differentiating cognitive structure, flexibility, and plasticity by means of individual differences shows how previously established work of the field can be better linked and also how it can be further developed. We might even conclude that an individual difference focus can nicely put together all three perspectives by asking questions like "Is the relation between flexibility and plasticity mediated by structural limitations?". We ask for research that investigates different degrees of flexibility and variance in structure more systematically, reflecting human's tendency to circumvent cognitive bottlenecks and to maximize the performance score across the lifespan, including more longitudinal designs (for an exception see Yang et al., 2019). Therefore, we ask for research designs that do not oversimplify the complexity of human cognition and for multivariate data analyses and multilevel models which allow the portioning of inter- and intra-individual variability (e.g., Meiran, 2000; Wasylyshyn et al., 2011). One promising line of future research is to employ more complex multitasking paradigms that involve more than two tasks and allow participants to freely choose the order and number of chosen tasks within a limited time frame, with the aim to examine inter-individual differences of multitasking performance in relation to cognitive structures, age (Frick et al., 2021), as well as to process organization. Another possibility is to establish multicentre studies that use the same paradigms and individual differences to increase data reliability and progress the field further. Ultimately, one challenge would be to not only understand what structural or flexible aspects characterize a supertasker, but to achieve optimal person-task fit. Research could for instance match task and processing mode, allow response organization according to cognitive constraints or train individuals to achieve optimal multitasking performance depending on their preferred strategies. This might include individual adjustment of instructions, stimuli, number of trials or feedback and incentives. Eventually, more results on individual differences can help to re-evaluate the established theoretical frameworks on multitasking interference to create a more complete and diverse understanding of multitasking functioning in humans.

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