**Thoughts on idionomic vs. group-based approaches to predicting the behavior of individuals**

We agree that the ergodicity assumption is often violated and that there is merit in developing conceptual and statistical tools for describing and analyzing the behavior of an individual as it develops over time in interaction with its environment. We also agree that in some cases, group-based statistics only tells us something about the “average individual”. As Sidman already argued convincingly in his “tactics” book, knowledge about the average individual does not necessarily inform us about actual individuals.

We still believe, however, that in many cases group-based statistical methods do provide useful **additional** tools for predicting the behavior of individuals. This does not mean that future ideographic methods cannot achieve better prediction but there are several reasons for not dismissing group-based statistical models too quickly.

* **Pragmatically**, it will simply not always be possible to collect sufficient data of one individual to allow for robust idiographic analyses. It is also not yet clear what idiographic concepts and tools are appropriate. Hence, at least in cases where idiographic analyses are (at the current moment) challenging, group-based statistical methods can provide a pragmatic solution. Group-based approaches can also interface well with (and perhaps may even be necessary for the success of) idiographic methods and provide the first step in predicting and influencing the behavior of an individual. Consider, for example, an instance where we wish to administer a psychological treatment to an individual suffering from extreme depression. We will likely be immediately met with some challenges (e.g., how many sessions of the therapy should they do per week, which techniques should be used in what order, etc.). In an ideal world, we would use idiographic methods to firstly ascertain a baseline on particular measures of interest, and then make decisions based on this. But for this individual, it may not be ethical or practical to obtain a baseline: they may be at risk of lapsing from treatment in the absence of immediate therapy, may cause themselves harm, etc. In this case, it may be more beneficial to make an initial determination based on group-level methods: using the parameters of this specific individual, make predictions about what will work from previous cases. This would identify a “baseline” with which to begin treatment, which can then be dynamically adapted using idiographic methods. Indeed, the use of group-level statistics is highly useful in such cases: similarly in deciding the dosage for a particular medication, etc.
* **Also pragmatically,** even if we regard group-level statistical methods as inferior, the fact of the matter is that at present, essentially all research in CBS is done at this level. We understand the task force report urges researchers to shift from this to individual-level work; however, this verbal intervention alone will not be sufficient to compete against the range of academic and institutional contingencies, and extant learning histories, that presently maintain the use of group-level statistics. In the absence of any structural change, as behaviourists we cannot expect many researchers to change their behaviour so substantially. By offering the “train-and-test” perspective, this offers a more accessible introduction to thinking at the individual-level which requires a much less substantial shift in behaviour.
* **Technically**, group-based statistics offer several ways of considering the level of the individual. As argued in our commentary, it can be useful to engage in statistical modelling with separate phases of (a) training the model on a large sample of individuals and (b) producing and evaluating predictions based on the model. These are methods which are regularly used in the world of data science to make highly accurate and useful predictions about individuals. Of course, these predictions are not perfect. However, even in instances where they are not perfect, we can parameterize and understand their inaccuracy using various metrics. We can also employ this method not only with simple regression, but also with more complex modelling techniques that allow the modelling of variance from individuals/groups of individuals, such as multilevel (AKA mixed effects) modelling. These methods can also allow us to parameterize the extent to which individual-level variation is present in our data, which may act as a sort of test of the violation of the ergodicity assumption (though we don’t know of any work that currently uses random effects in this way). We can also parameterize this further by modelling changes across time by participant, etc.
* **Also technically,** there will likely be accompanying problems with idiographic methods that are developed. While we have now discussed at length the relative effectiveness of group-level statistics, their nuances, and their pitfalls, we should also try to evaluate these alternative methods in a similar manner. Might there be implicit statistical assumptions that can also be critiqued in these approaches? Issues related to estimation? Violations of assumptions to be parsed out? Most critically: is there any evidence, at present, of the incremental predictive utility of these methods, or is the argument at present purely philosophical/conceptual? Idiographic methods should receive this same level of scrutiny once they are developed. For instance, many single-case experimental designs (SCEDs) use bespoke measurement procedures that are improperly validated (if at all).
* **Conceptually**, all statistical techniques, including idiographic ones, rest on assumptions about how data are generated. Group-based statistical methods indeed assume systematicity in data generation across individuals. Idiographic methods, however, also assume systematicity, for instance in data generation for an individual across time. Often, these assumptions are violated. However, it is not because these assumptions can be or are violated that a statistical technique should be dismissed. Indeed, many assumptions of statistical models are often violated, yet these models can still yield valid and useful predictions. Violations of assumptions of statistical models can also be counteracted through further modelling: for instance, the transformation of log-normal data to normally-distributed data using log transformation. It is worthwhile to examine whether issues of ergodicity can be modelled/accounted for in group-level statistics.
* **Both conceptually and technically**, an understanding of the extent to which ergodicity assumptions are violated can only be properly ascertained in group-based statistics when we are certain that our measurement procedures are valid and reliable. If measurement procedures are imprecise at the individual-level (as is often the case in psychological research), then we may see sources of unwanted variance at the intraindividual level which we erroneously attribute to variance in the “construct” of interest, rather than being due to variance associated with measurement error in our measurement instruments. This is essentially problem of epistemic vs. aleatoric uncertainty. If we want to be certain of the extent of the problem of ergodicity in our research, we firstly need to focus our efforts on improving the currently-poor measurement practices of the field (which will also benefit idiographic research, given that the typically-shorter measures used in designs like SCED are at an even greater threat of measurement problems).
* **Empirically**, there is evidence that, under many conditions, group-based statistical methods can achieve excellent prediction of individual exemplars. Consider the effectiveness of machine/deep learning data science methods in a wide variety of modern contexts.
* At the **philosophical** level, science requires assumptions of systematicity. Although each individual event might be unique, science makes sense only when assuming that learning about some individual events can inform you about other individual events. These events might be the behavior of one individual (or a group of individuals) that informs us about the behavior of another individual or the behavior of one individual that informs us about another behavior of the same individual. The aim of science will always be to capture and use knowledge about systematicity in nature. This can be done via statistical techniques (e.g., quantitative models) but also via (combinations of) nomothetic principles that are used as models for predicting individual behavior. Although there may naturally be distinct profiles of change, group-level statistics can help us abstract these distinct profiles of change/determine whether they cluster in some manner.

*The above text was written by Jamie Cummins and Jan De Houwer based on a discussion during a LIP lab team meeting about the papers of Molenaar and Campbell (2009) and Hayes et al. (2022; Section 4). We sent this text to Steven Hayes after he raised questions about a commentary paper by De Houwer and Cummins (2022).*

*First posted on 15 December 2022.*

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