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Child Development Special Section: Formalizing Theories of Child Development

Child Development invites manuscripts for a Special Section on *Formalizing Theories of Child Development*. The Special Section Editors are **Willem E. Frankenhuis** (Utrecht University), **Denny Borsboom** (University of Amsterdam), **Daniel Nettle** (Newcastle University), and **Glenn I. Roisman** (in his role as Editor-in-Chief of *Child Development*).

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About the Special Section

In the wake of the replication crisis, there have been fruitful initiatives to increase transparency in empirical research (e.g., preregistration). These initiatives promote reliable and reproducible findings—and such findings are essential for *cumulative developmental science* (Roisman, 2021). But solid foundations are not enough; we need theory to build the house (Muthukrishna & Henrich, 2019). At the present time, few theories are well-equipped to cement findings into larger wholes with clear contours. Most theories are described in natural language, which tends to be ambiguous, even if carefully crafted. Accordingly, theories include imprecise concepts, implicit assumptions, and predictions based on intuitive reasoning rather than

deduction. This typically leaves room for disagreement about which predictions a theory makes, which types of data are best suited to testing a theory, and which patterns of data provide evidence for and against a theory (Fried, 2020). Thus, ambiguity hinders cumulative knowledge building. It also impedes falsifiability by enabling researchers to invoke post-hoc explanations to rescue a theory from inconvenient data. Lastly, it obstructs building bridges with formal theory in allied fields, such as biology (Frankenhuis & Walasek, 2020).

The goal of this section is to showcase what mathematical and simulation-based modeling can accomplish for central questions in the study of child development. By *mathematical modeling*, we mean that a theory is expressed in terms of equations that characterize the systems or processes under study, and that may be analytically solved. By *simulation-based modeling*, we mean generating data based on assumed underlying architecture of the systems or processes modeled. Mathematical models and simulation-based models differ from statistical models. The former describe coherent sets of statements about the world and the relations that obtain among them; these may, but need not be, informed by an empirical dataset (e.g., formal models of intelligence development; van der Maas et al., 2006). The latter describes relations between variables in an empirical dataset; these may, but need not be, informed by theory (e.g., factor analyses or network analyses of empirical data; Haslbeck et al., 2021). All papers in this section should include one or more mathematical or simulation-based models. Papers may additionally include statistical models to empirically test theoretical predictions derived from formal models or to calibrate such models to the data. However, papers discussing only statistical models, without presenting a formal theoretical model, are not well-suited to this section.

By formalizing theories, mathematical and simulation-based models make all concepts, assumptions, and reasoning explicit. Because a formal theory is stated in mathematical terms, it is decoupled from any particular person's mind; it is a public good for anyone to evaluate. Clarifying and sharing theories in this way fits with SRCD's core values of integrity, transparency, and openness, and with the broader effort to support Open Science (Guest & Martin, 2021). However, valuing formal theory does not imply devaluing non-formal theory (Nettle, 2021; Scheel et al., 2021). Theory construction is a process of maturation (Borsboom et al., 2021; Smaldino, 2020). In the early stages of this iterative process, concepts, assumptions, and predictions may change and be refined. However, once hypotheses are claimed to 'follow from' or be 'derived from' the theory, the logical chain from assumptions to predictions should be fully identified (Harris, 1976). This allows others to verify and reproduce the theoretical analysis.

We invite Letters of Intent (LOI) for papers that use formal models to advance understanding of a central question in the study of child development. The papers proposed for this Special Section via LOI **must** do the modeling work, rather than being idea pieces that stop at providing thoughtful reflection. Ideally, proposed submissions will also compare insights gained from the modeling studies with empirical data. Proposed submissions may test quantitative (parametric) or qualitative (directional) predictions in a dataset (ideally preregistered), or through systematic meta-analysis or review of the existing empirical record (also ideally preregistered). We encourage submissions from all fields and sub-fields focused on research on child development. We envision the section consisting of 4-5 papers, introduced by an editorial. Papers should be written in an accessible manner and for a broad audience.

Our main criterion for evaluation is whether the proposed modeling advances a central question in the study of child development. As such, the LOI should motivate a research question about development, explain the chosen modeling approach, and justify why this approach is well-suited to studying the question. Our evaluation does not depend on the extent to which the empirical data are consistent with the predictions of the model(s). In this sense, testing formal models is subject to the same ethical guidelines as testing non-formal models: we should not suppress null or mixed results. Some models might teach us that a central theory in the field is not able to explain an empirical pattern that it purports to explain (van Rooij & Baggio, 2021). Other models might make new predictions about a well-established phenomenon, which are subsequently tested in an empirical dataset. That said, all theoretical and empirical analyses should be computationally reproducible (or, please explain why this is not possible).

Timeline and Detailed Submission Requirements

February 1, 2022

Authors who plan to submit a manuscript for the special section **must submit a letter of intent (LOI) through the SRCD application site by February 1, 2022**. The LOI MUST include:

- a tentative title
- an author list and contact details
- a brief scientific case (approximately 1000 words) for consideration of the proposed submission
- the proposed methods and (if applicable) initial findings

The special section editors will review letters of intent for fit with the section and work to provide the broadest representation of high-quality papers.

March 1, 2022

Following a review of the LOIs, potential contributors will be contacted by March 1, 2022 and asked to submit a full manuscript. Submissions should not exceed 40 pages in length, inclusive of everything (body text, references, tables/figures, etc.). Extensive use of web supplements is also strongly encouraged. Please review the *Child Development Submission Guidelines* for additional requirements.

Please also include 'Formalizing Theories:' at the start of your paper title within the editorial system for processing purposes. (Note: The addition will not be included in publication.)

May 1, 2022

Invited manuscripts should be submitted through *Child Development*'s submission portal by or before May 1, 2022. Note: This is a different submission portal than was used for the LOI. All manuscripts will undergo *Child Development*'s rigorous peer review process.

August 15, 2022

Request for revisions will be sent back to authors by or before August 15, 2022.

October 15, 2022

Revised manuscripts should be submitted through *Child Development*'s submission portal.

February 15, 2023

A final decision will be rendered by February 15, 2023. Accepted manuscripts will be published online following receipt of required author paperwork and author proof-review.

May/June 2023

Expected issue publication.

IMPORTANT: All LOIs must be submitted through the SRCD Special Section Application Site. LOIs submitted by email or through the Child Development submission portal will not be considered for the collection.

Application portal

Submitting your Letter of Intent (LOI)

To access the application, click the link above and use your SRCD credentials to log in to the SRCD application site. If you do not already have an SRCD account, you can create one by clicking on the "Create an Account Login Now" link at the bottom of the login page. Please note that you do NOT need to be an SRCD member to have an SRCD account. Contact scholar@srcd.org for assistance with the submission portal.

Questions?

If your question concerns the **substance of submissions**, please direct it to: Willem E. Frankenhuis (w.e.frankenhuis@uu.nl).

If your question concerns the manuscript **submission process**, please contact SRCD's Publications Manager at cdev@srcd.org or mlutchkus@srcd.org.

If your question concerns **technical difficulties** with the LOI application portal, please contact scholar@srcd.org.

REMINDER: Do not submit LOIs by email to the Co-Editors or Publications Office or through the Child Development journal submission portal. LOIs must be submitted through the SRCD application site detailed above to be considered.

Application portal

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