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A Brief Response to ‘Deepening Our Understanding of Developmental Assessments Use in Developing Leaders’ Capacity for Complexity’

Aiden M. A. Thornton, PhD¹

Reams (2023) reviews many arguments I make in the context of my doctoral dissertation (Thornton, 2023). I appreciate his intent to make these arguments more accessible to readers who may not have a background in quantitative analytics. The purpose of this article is to provide a brief response to some of the more salient points that he raises. I provide responses to points in the order in which they occur in Jonathan’s review.

Point 1

“Hard stage models are defined by five criteria: unidimensionality, invariant sequencing, qualitative distinctness, structured wholeness, and hierarchical integrations” (Reams, 2023, p. 391).

Strictly speaking, hard stage models are defined by four requirements, not five. Piaget (1960, 1968, 1972) originally described the attributes that distinguished cognitive-developmental stages from other types of stage models. These attributes informed Kohlberg’s (1987; 1969, 1975) conception of hard stages which were defined by four requirements: invariant sequence, qualitative distinctness, structured wholeness, and hierarchical integrations. I added the fifth requirement of unidimensionality because all ordinal scales – whether cumulative or hierarchical – need to exhibit unidimensionality by accounting for a single underlying construct that can be used to make distinctions between persons (Andrich, 1988; Rasch, 1980).

Point 2

“In my own words, the take-away is that while complexity is a central theme of leadership today, there are significant differences between how Lectica’s assessments address complexity and how sentence completion tests in ego development models approach complexity” (Reams, 2023, p. 391).

¹ **Aiden M. A. Thornton, PhD** is a leadership scientist, management consultant, and amateur epistemologist. Aiden will soon be starting an academic position in leadership and complexity at a leading Australian university. He runs a management consulting practice based in Melbourne, Australia which is focused on leader and leadership development, and a variety of topics related to organisational development. Finally, he is in the process of launching a psychometrics company that aims to provide world-class measures of leadership for the purpose of scientific research and practice.
aiden@aidenmathornton.com



This interpretation may diverge somewhat from the intent behind Research Question 1 which was ‘Do cognitive-developmental scores awarded by the Lectical Assessment System (LAS), and ego development scores awarded by the ego development scoring system, satisfy hard stage requirements?’ I was not necessarily trying to identify differences in *how* the two assessments address complexity, but *whether* both assessments were successful at measuring a particular type of complexity (i.e., hierarchical complexity), and could therefore be used to make inferences about leaders’ ability to navigate complexity. I included cognitive-development scores and ego development scores because both sets of scores are contended to reflect a hierarchically integrated construct. If cognitive developmentalists or ego developmentalists claimed that their respective stages were sequenced in a non-hierarchical manner, then the analyses I performed in the context of addressing Research Question 1 may be less relevant.

Point 3

The field of cognitive-developmental psychology “... sees ‘cognition’ as much more than mere intellectual thinking or reasoning, but that it holistically integrates emotion, embodiment and dynamic environmental relations” (Reams, 2023, p. 394).

This is an important point which cannot be adequately addressed in the context of this brief response. In short, however, there may be reasons to believe that the term *cognition* takes on different meanings in different contexts. In speaking of cognition, ego developmentalists and cognitive-developmentalists may risk ‘talking through’ each other rather than engaging in meaningful dialogue. I offer Figure 1 below as a brief way of summarising my understanding of how cognition may be conceptualised by ego developmentalists (Cook-Greuter, 1999; Loevinger, 1976; Torbert, 1987) and cognitive-developmentalists (Fischer & Bidell, 2006; Piaget, 1968; Styles, 1999) as a starting point for further elaboration. For ego developmentalists, the ego performs the synthetic function of coordinating relations between thought / cognition, emotion, motivation, meaning, and action. For cognitive-developmentalists, cognition (e.g., executive function) performs the synthetic function of coordinating relations between thought, emotion, motivation, meaning, and action.

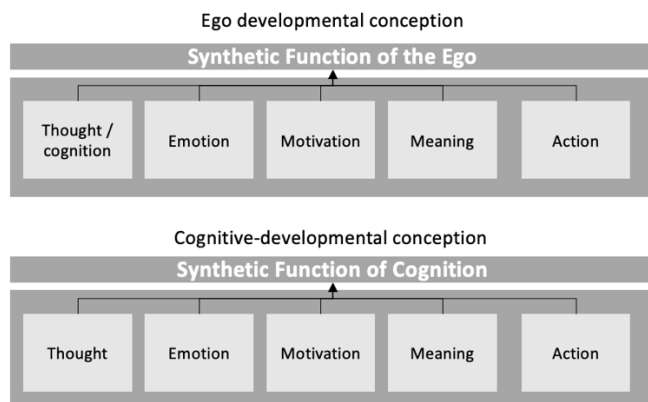


Figure 1. Potential Differences in Conceptions of Cognition Between Ego Developmentalists and Cognitive-Developmentalists

Point 4

“I was surprised by the distribution curve in Table 7. It showed the peak of the distribution curve to be in 11b” (Reams, 2023, p. 395). Jonathan goes on to discuss possible explanations for the modal score occurring in 11b including test-takers’ use of jargon.

Another explanation that I discuss in the context of Study 1A is the possibility of an interaction between the hierarchical complexity of LDMA items and the hierarchical complexity of test-takers’ responses. As seen from Figure 11 most LDMA items occur in the transition between Lectical Phase 11b and 11c (Thornton, 2023, p. 73). As seen from Table 7, most test-takers scored in 11b and 11c (Thornton, 2023, p. 69). It remains an open empirical question as to whether the hierarchical complexity of LDMA items influences the hierarchical complexity of test-takers’ responses. This may be considered in future research. For a more elaborated discussion on this topic refer to Thornton (2023, pp. 86-88).

Point 5

Jonathan refers to a number of studies I reviewed that suggest that ego development is more multidimensional. He suggests that this may be attributable to the more holistic nature of ego development stages and their potential ‘fuzziness’ (Reams, 2023, pp. 396, 398)

To address this point, it may be important to distinguish between the concept of being *multifaceted* versus the concept of being *multidimensional*. While there may not be universal agreement on the distinctions between these terms, I offer the following definitions. Being multifaceted may be a property of a construct whereas being multidimensional is a property of an assessment. Ego development is multifaceted in the sense that it is a broad construct that strives to integrate multiple aspects of the human condition e.g., impulse control, interpersonal styles, conscious preoccupations, and cognitive style (Loevinger, 1976). Despite the multifaceted nature of the construct, an assessment of ego development should still be unidimensional in the sense that ego development is the only construct being measured by the assessment in question. If an assessment violates unidimensionality, this suggests that a total score on an assessment does not adequately summarise test-takers’ performance on an assessment and therefore does not reflect the amount of the underlying construct that can be attributed to test-takers. I discuss this matter further in Thornton (2023, p. 209).

Point 6

“So, from this, could it be that while the Lectical assessment system does a good job of measuring hierarchical complexity of linguistic representations of thinking, by being precise and specific, ED attempts to get at more of the non-linguistically represented aspects of consciousness, and from this suffers when measured against stricter constructs?” (Reams, 2023, p. 400).

Cognitive-developmental assessments are typically used to make inferences about reasoning skills in a specific domain. In contrast, ego development assessments are typically used to make broader (and perhaps deeper) psychological inferences about test-takers’ worldviews,

consciousness, and their phenomenological experience of reality that may go beyond symbolically mediated ways of knowing. Despite these distinctions, the only phenomena that adult developmentalists can access are sensory-motor actions and / or language. For this reason, some ego developmentalists have argued that the SCT is a measure of meaning-making as reflected in verbal behavior (Cook-Greuter, 1999). In addressing Point 6, perhaps a key consideration is the extent to which we can make inferences about internal psychological phenomena that we cannot directly access, and therefore the extent to which it is justified to use the psychological instruments to make inferences about non-linguistically represented aspects of consciousness.

Point 7

“Reflective abstraction is focused on in this discussion and while Lectical assessments might be a good structure for encouraging this activity, ego development assessments, used well by practitioners, might also foster this. I would have appreciated this being made explicit” (Reams, 2023, p. 406).

This is an engaging possibility which is worthy of further consideration. The SCT may provide feedback that supports general reflection and engagement with practices that may foster the development of the ego and/or worldview. However, it is unclear that the measurement properties of the SCT renders it suitable to triggering the process of reflection abstraction. As I discuss in Chapter 2 of my dissertation, reflective abstraction is a process via which lower-order cognitive structures are transformed into qualitatively distinct higher-order structures such that cognitive structures become hierarchically integrated in the mind-brain (Piaget, 2000; Smith et al., 2019). Given the literature review I present on ego development in Study 1B and also the findings reported in Studies 1B, 2A, 2B, and 2C, scores yielded by the ego development scoring system do not appear to satisfy most hard stage requirements (with the exception of invariant sequence). As a result, it remains to be determined whether ego development scores could be used to identify practices that may foster reflective abstraction.

Point 8

“[Aiden] also indicates the implication that ego development may not constitute vertical development in the manner that the term has been used in popular literature. (Vertical development has become a common phrasing being used to indicate developmental growth among several practitioners. ...)” (Reams, 2023, p. 405).

Vertical development is a term that seems to be used more liberally in the practitioner literature (Petrie, 2014) and more sparingly in scholarly literature (Cook-Greuter & Soulen, 2007). Irrespective of the contexts in which the term is used, this term seems to be a way of referring to hierarchically integrated developmental stages. That is, hierarchical integrations put the verticality into vertical development. It seems relatively clear that when stage models are being referred to as ‘vertical’ this is because they are being attributed properties that are similar – or possibly the same – as those attributed to Piaget’s cognitive-developmental stages (Piaget, 1952) and Kohlberg’s hard stages (Kohlberg & Armon, 1984). As a result, testing whether adult development stages, and scores yielded by adult development scoring systems, satisfy hard stage requirements may afford a direct way of distinguishing between vertical and non-vertical approaches to

development. I argue that “ego development cannot clearly be considered an instance of ‘vertical development’” because there seems to be relatively little evidence to suggest that these stages satisfy hard stage requirements (Thornton, 2023, p. 291).

Point 9

Aiden makes some strong claims such as, “the findings reported on measurement of ego development ... may imply that the central tenets of ego development stages may need to be revisited” (p. 289) and “ego development scores do not seem to be well suited to making inferences about leaders’ ability to navigate complexity” (p. 289). These are serious statements that challenge a reasonable body of research, saying that some of the fundamental theoretical and measurement assumptions and assumed linkages to cognitive complexity, and thus by proxy, a key element of leader capability. There are also important implications for the variability of scoring of ED stages in relation to different stem types or domains; “ego development stages have different meanings in different contexts (p. 290). (Reams, 2023, p. 405)

There are a number of considerations in response to point 9.

First, the strength of a claim need not impact its veracity – even if these claims were shown to be strong, it is unclear that this would be sufficient to call the truth of these claims into question.

Second, I accept that there is a reasonable body of research on ego development and the SCT. However, distinctions need to be made between different types of research. Significant research has been directed towards evaluating the general measurement properties of the SCT (Cook-Greuter, 1999; Loevinger, 1998; Loevinger & Wessler, 1970; Torbert & Livne-Tarandach, 2009) and also towards examining the relation between ego development and a variety of other variables (Blasi, 1993; Broughton & Zahaykevich, 1988; Hauser, 1976, 1993; Loevinger, 1979, 1993; Manners & Durkin, 2001). However, there appears to be a paucity of pure research directed towards validating the hierarchically integrated properties that are consistently attributed to ego development stages. As result, it is not immediately apparent that the findings reported my dissertation contradict findings presented in earlier aspects of the literature.

Third, there are sound reasons to believe that the two quotes that Jonathan provides above are defensible.

In relation to the quote “ego development scores do not seem to be well suited to making inferences about leaders’ ability to navigate complexity” (Thornton, 2023, p. 289), the reasons for this are spelled out in Table 58 of my dissertation. In short, the SCT seems to violate the requirement of unidimensionality (at least for some subsamples), and this is consistent with the earlier literature that indicated that the ego development construct may only account for approximately 20% of variability in SCT scores (Blasi, 1971; Kishton et al., 1984; Lambert, 1972a, 1972b; Loevinger & Wessler, 1970; Lorr & Manning, 1978). As such, a total score on the SCT may not be a sound reflection of the construct it is intended to measure. Even if unidimensionality were satisfied, the literature review presented for Study 1B in combination with the findings reported for Studies 1B, 2A, 2B, and 2C suggest that the hard stage requirements of qualitative

distinctness, structured wholeness, and hierarchical integrations do not seem to be satisfied. For these reasons, ego development scores do not seem to be well suited to making inferences about leaders' ability to navigate complexity.

In relation to the quote that my findings may imply that the “central tenets of ego development theory may need to be revisited” (Thornton, 2023, p. 289), I also contend that this is a defensible position. One of the central tenets of ego development theory is that stages are hierarchically integrated (Cook-Greuter, 1999; Fisher et al., 1987; Loevinger, 1976). As discussed in Chapters 2 and 6 respectively, ego development theory was primarily developed through inductive and abductive methods. “EDT has been developed and refined over at least 40 years by *empirical means* unlike almost all other development approaches which first propose a theory, then find appropriate means to measure their construct” (Cook-Greuter, 2013, p. 4) and also that “I can’t actually think of any exception of this. If you, the reader, knows of any major developmental theories that are entirely evidence based, please let us know” (Cook-Greuter, 2013, p. 92). In the absence of consistent empirical evidence that ego development stages are hierarchically integrated (refer to the literature reviews for Studies 1B, 2A, 2B, and 2C) and also in the presence of findings reported in my dissertation, it seems reasonable to suggest that these empirical findings should play a role in influencing the central tenets of ego development theory.

Point 10

Jonathan suggests that I make particular claims about the way that ego developmentalists have conceived of the relation between ego development stages and stages of hierarchical complexity. He goes on to indicate that some ego developmentalists may be arguing for an approximate relation between ego development stages and stages of hierarchical complexity rather than a direct one-to-one correspondence. See for example Reams (2023, p. 408).

The purpose of Appendix A was to provide a relatively comprehensive list of hard stage claims made by ego developmentalists (Thornton, 2023, pp. 343-353). I accept that there are contexts in which ego developmentalists seem to be indicating an approximate relation between ego development stages and stages of hierarchical complexity. However, I contend there are other contexts in which one-to-one correspondences seem to be indicated. For example in *Ego Development: Conceptions and Theories*, Loevinger (1976, pp. 68-135) provides several tables that seem to indicate a direct correspondence between ego development stages and various other stages models, and some of which have cognitive-developmental origins. Similarly, in an article that was co-authored by Torbert (1987, p. 260), a table is presented in which direct correspondences between ego developments and Kohlberg’s stages of moral reasoning seem to be indicated. It may be true that ego developmentalists are positing the existence of approximate relations between their stages and stages of hierarchical complexity, but perhaps tables of correspondence may not be the clearest way of conveying this sentiment.

There is, however, a more serious issue that arises with this interpretation. If there is only an approximate correspondence between ego development stages and stages of hierarchical complexity, then this implies that hierarchical integrations do not fully – or perhaps adequately – account for the transformation of performance between successive stages. This may also relitigate

considerations about the logic that underpins the ego development scale and the basis for distinguishing between adjacent stages (Cook-Greuter, 1990; Habermas, 1979; Noam, 1993).

Point 11

Jonathan (along with several others that I have spoken with on a more casual basis) raises questions about the importance of making distinctions between hard and soft stage models, and whether there might be more important questions to address in the field of adult development (refer p. 410).

I argue that making distinctions between different types of developmental models (e.g., hard stages, soft stages, cultural ages) is an important issue (along with several other issues that I describe below). It is generally well recognised why it might be troublesome for practitioners to implement approaches that are not fit-for-purpose. For example, what if a practitioner administered a personality questionnaire to make inferences about leaders' intelligence? Or what if a consultant administered an intelligence test to make inferences about leaders' socio-emotional wellbeing? Or what if a leadership coach facilitated a diagnostic about leaders' socio-emotional wellbeing to make inferences about leaders' collaborative capacity? In all three examples, there are sound reasons to believe that these approaches are not fit-for-purpose. In the context of adult development, there may be reasons to believe that scholars and practitioners alike have a moral obligation to ensure that their approaches (e.g., theories, measures, and interventions) are fit-for-purpose. If scholars strive to construct new knowledge about complexity, and if practitioners strive to apply this knowledge to support leaders to navigate the complexity in their workplaces, it seems reasonable to expect that:

- our **theories** describe, explain, predict, and make-sense of complexity; and that
- our **measures** do a sound job of directly measuring complexity and allowing us to make inferences about it; and that
- our **interventions** facilitate the development of complexity or can mitigate the impact of the complexity gap in individuals and/or teams.

In the absence of distinctions between hard stage models (or at the very least, distinctions between other meaningful manifestations of complexity) and other types of developmental models, how else might we ensure that our approaches are fit-for-purpose given that a shared goal might be to support leaders' who are grappling with organisational, social, political, and environmental complexity? Not only this, but as I discuss in Chapter 1 there may be reasons to believe that hard stages account for a unique proportion of variability in leadership criterion variables e.g., leader role occupancy, leader effectiveness, etc. For example, hierarchical integrations may be one of the few – perhaps the only – way of accounting for the distinctions between concrete thinking, linear thinking, systems thinking, and even more advanced forms of reasoning.

As I discuss in Chapter 1, hard stages may not be the best or only way of conceptualising and measuring complexity. For example, it is possible that a certain amount of *network density* (which

is a measure of social cohesion) may be even more strongly associated with leaders' and teams' ability to navigate complex organisational conditions (Wise, 2014).

Finally, as mentioned above, there may be other issues that the field of adult development may choose to explore more thoroughly. These include, but are not limited to:

- establishing clearer relations between hierarchical complexity and leadership criterion variables (this is something that I'm currently working on)
- establishing the properties of instruments that may be able to measure the hierarchical complexity of group performance (this is something that I currently piloting)
- evaluating the efficacy of developmental practices in terms of their ability to foster developmental complexity and high-quality reasoning skills (particularly the type of reasoning skills that can be applied in complex organisational conditions)
- better understanding the relations between adult development theory and other conceptions of complexity, such as those provided by Complexity Leadership Theory (Uhl-Bien et al., 2007), and leader complexity models (Hannah et al., 2011; Lord et al., 2011).

Point 12

Jonathan expresses curiosity about my interest in epistemic adequacy and truth. For example, he asks "I'm reminded of a question I once heard: Is it more important to be right or in right relationship?" (Reams, 2023, p. 410), and also gestures towards a similar point by reflecting on the underlying purpose of my research "While we can say that any model or assessment in the hands of a good practitioner can be of value for a client, it is worth stepping back and questioning this. This is one way I would characterize the impulse behind Aiden's research" (Reams, 2023, p. 391).

I think there are sound reasons to believe that pursuit of truth and the pursuit of relationships are mutually reinforcing goals rather than pursuits to be decided between. The pursuit of truth might play a role in deepening some relationships and inform decisions about those we do – and perhaps do not – wish to be in relationship with. Conversely, some relationships may play a role in gaining a more complex, broad, and deep conception of truth. Evaluating epistemic adequacy is always likely to be situated in interpersonal contexts and for this reason, it may not be possible for these two considerations to be decoupled.

I appreciate the opportunity to provide this response at short notice and I hope that it serves to clarify my position on some considerations raised by Reams (2023).

References

- Andrich, D. (1988). *Rasch models for measurement*. Sage Publications.
- Blasi, A. (1971). *A developmental approach to responsibility training* [Doctoral dissertation, Washington University]. Washington.
- Blasi, A. (1993). The theory of ego development and the measure. *Psychological Inquiry*, 4(1), 17-19. https://doi.org/10.1207/s15327965pli0401_2
- Broughton, J., & Zahaykevich, M. (1988). Ego and ideology: A critical review of Loevinger's theory. In D. Lapsley & F. Powers (Eds.), *Self, ego and identity: Integrative approaches* (pp. 179-208). Springer-Verlag.
- Colby, A., & Kohlberg, L. (1987). *The measurement of moral judgment: Theoretical foundations and research validation* (Vol. 1). Cambridge University Press.
- Cook-Greuter, S. (1990). Maps for living: Ego-development stages from symbiosis to conscious universal embeddedness. In M. L. Commons, C. Armon, L. Kohlberg, F. A. Richards, T. A. Grotzer, & J. D. Sinnott (Eds.), *Adult development volume 2: Models and methods in the study of adolescent and adult thought* (pp. 79-104). Praeger Publishers.
- Cook-Greuter, S. (1999). *Postautonomous ego development: A study of its nature and measurement* [Doctoral dissertation, Harvard University]. Boston, USA.
- Cook-Greuter, S. (2013). *Nine levels of increasing embrace in ego development: A full-spectrum theory of vertical growth and meaning making*.
- Cook-Greuter, S., & Soulen, J. (2007). The developmental perspective in integral counseling. *Counseling and Values*(April), 180-192.
- Fischer, K., & Bidell, T. (2006). Dynamic development of action, thought and emotion. In W. Damon & R. M. Lerner (Eds.), *Theoretical models of human development: Handbook of child psychology* (6th ed., pp. 313-399). Wiley.
- Fisher, D., Merron, K., & Torbert, W. (1987). Human development and managerial effectiveness. *Group and Organization Studies*, 12(3), 257-273.
- Habermas, J. (1979). *Communication and the evolution of society*. Beacon.
- Hannah, S. T., Lord, R. G., & Pearce, C. L. (2011). Leadership and collective requisite complexity. *Organizational Psychology Review*, 1(3), 215-238.
- Hauser, S. (1976). Loevinger's model and measure of ego development: A critical review. *Psychological Bulletin*, 83(5), 928-955.
- Hauser, S. (1993). Loevinger's model and measure of ego development: A critical review: II. *Psychological Inquiry*, 4(1), 23-30. https://doi.org/10.1207/s15327965pli0401_4
- Kishton, J., Starrett, R., & Lucas, J. (1984). Polar versus milestone variables in adolescent ego development. *The Journal of Early Adolescence*, 4(1), 53-64.
- Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In D. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 346-480). Rand McNally.
- Kohlberg, L. (1975). The cognitive-developmental approach to moral education. *Phi Delta Kappan*, 56(10), 670-677.
- Kohlberg, L., & Armon, C. (1984). Three types of stage models used in the study of adult development. In M. Commons, F. Richards, & C. Armon (Eds.), *Beyond formal operations: Late adolescent and adult cognitive development* (pp. 383-394). Praeger.

- Lambert, H. (1972a, September 2-8). Comparison of cognitive developmental theories of ego and moral development [Paper presentation]. Proceedings of the 80th Annual Convention of the American Psychological Association, Honolulu, Hawaii, USA.
- Lambert, H. (1972b). *A comparison of Jane Loevinger's theory of ego development and Lawrence Kohlberg's theory of moral development* [Doctoral dissertation, University of Chicago]. Chicago.
- Loevinger, J. (1976). *Ego development: Conceptions and theories*. Jossey-Bass Publishers.
- Loevinger, J. (1979). Construct validity of the sentence completion test of ego development. *Applied Psychological Measurement*, 3(3), 281-311.
- Loevinger, J. (1993). Measurement of personality: True or false. *Psychological Inquiry*, 4(1), 1-16.
- Loevinger, J. (Ed.). (1998). *Technical foundations for measuring ego development: The Washington University Sentence Completion Test*. Lawrence Erlbaum Associates Publishers.
- Loevinger, J., & Wessler, R. (1970). *Measuring ego development: Construction and use of a sentence completion test* (Vol. 1). Jossey-Bass.
- Lord, R. G., Hannah, S. T., & Jennings, P. L. (2011). A framework for understanding leadership and individual requisite complexity. *Organizational Psychology Review*, 1(2), 104-127.
- Lorr, M., & Manning, T. (1978). Measurement of ego development by sentence completion and personality test. *Journal of Clinical Psychology*, 34(2), 354-360.
- Manners, J., & Durkin, K. (2001). A critical review of the validity of ego development theory and its measurement. *Journal of Personality Assessment*, 77(3), 541-567.
- Merron, K., Fisher, D., & Torbert, W. (1987). Meaning making and management action. *Group and Organization Studies*, 12(3), 274-286.
- Noam, G. (1993). Ego development: True or false? *Psychological Inquiry*, 4, 43-48.
- Petrie, N. (2014). Future trends in leadership development [White paper]. <https://doi.org/https://doi.org/10.35613/ccl.2014.2033>
- Piaget, J. (1952). *The origins of intelligence in children*. Norton.
- Piaget, J. (1960). The general problems of the psychobiological development of the child. In J. M. Tanner & B. Inhelder (Eds.), *Discussions on child development: Proceedings of the world health organization study group on the psychobiological development of the child* (Vol. 4). International Universities Press.
- Piaget, J. (1968). *Structuralism*. Harper & Row.
- Piaget, J. (1972). *The principles of genetic epistemology*. Basic Books.
- Piaget, J. (2000). *Studies in reflecting abstraction* (R. L. Campbell, Trans.). Psychology Press.
- Rasch, G. (1980). *Probabilistic models for some intelligence and attainment tests* (Expanded edition 1980 ed.). Danish Institute for Educational Research.
- Reams, J. (2023). Deepening our understanding of developmental assessments use in developing leaders' capacity for complexity *Integral Review*, 18(1), 390-410.
- Smith, K., Bastin, M., Cox, S., Valdes Hernandez, M., Wiseman, S., Escudero, J., & Sudlow, C. (2019). Hierarchical complexity of the adult human structural connectome. *NeuroImage*, 191(1), 205-215.
- Styles, I. (1999). The study of intelligence - the interplay between theory and measurement. In M. Anderson (Ed.), *The development of intelligence* (pp. 19-42). Psychology Press.
- Thornton, A. (2023). *Facing the Complexity Gap: Developing Leaders' Reasoning Skills to Meet the Complex Task Demands of their Roles*. [Doctoral Thesis, The University of Western Australia].

- Torbert, W. (1987). *Managing the corporate dream: Restructuring for long-term success*. Dow Jones-Irwin.
- Torbert, W., & Livne-Tarandach, R. (2009). Reliability and validity tests of the Harthill Leadership Development Profile in the context of developmental action inquiry theory, practice and method. *Integral Review*, 5(2), 133-151.
- Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly*, 18(4), 298-318.
- Wise, S. (2014). Can a team have too much cohesion? The dark side to network density. *European Management Journal*, 32(5), 703-711.
<https://doi.org/https://doi.org/10.1016/j.emj.2013.12.005>