

# CDM reading list

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This is an extended reading list originally developed for the Cognitive Diagnosis Modeling class offered by Wenchao Ma at the University of Alabama. This list is by no means complete, but attempts to provide students with some general guidance so that they could better swim in the pool. If you'd like to add any references to the list, pull a request at <https://github.com/Wenchao-Ma/CDMreadinglist>.

## Books, Reviews and General Introduction to CDMs

- Bolt, D. (2007). The present and future of IRT-based cognitive diagnostic models (ICDM) and related methods. *Journal of Educational Measurement*, 44(4), 377–383. doi: 10.1111/j.1745-3984.2007.00045.x
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- Tatsuoaka, K. K. (2009). *Cognitive assessment: An introduction to the rule space method*. London: Routledge Academic.
- von Davier, M., & Lee, Y.-S. (Eds.). (2019). *Handbook of diagnostic classification models*. Cham: Springer International Publishing. doi: 10.1007/978-3-030-05584-4

## Psychometric Models and Approaches for Cognitive Diagnosis

### CDMs for dichotomous data

- Bradshaw, L., & Templin, J. (2014). Combining item response theory and diagnostic classification models: a psychometric model for scaling ability and diagnosing misconceptions. *Psychometrika*, 79(3), 403–425. doi: 10.1007/s11336-013-9350-4
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- Stout, W., Henson, R., DiBello, L., & Shear, B. (2019). The reparameterized unified model system: A diagnostic assessment modeling approach. In M. von Davier & Y.-S. Lee (Eds.), *Handbook of diagnostic classification models* (pp. 47–79). Cham: Springer International Publishing. doi: 10.1007/978-3-030-05584-4\_3
- Templin, J. L., & Henson, R. A. (2006). Measurement of psychological disorders using cognitive diagnosis models. *Psychological methods*, 11(3), 287–305. doi: 10.1037/1082-989X.11.3.287
- Templin, J., & Bradshaw, L. (2014). Hierarchical diagnostic classification models: a family of models for estimating and testing attribute hierarchies. *Psychometrika*, 79(2), 317–339. doi: 10.1007/s11336-013-9362-0
- von Davier, M. (2008). A general diagnostic model applied to language testing data. *The British journal of mathematical and statistical psychology*, 61(Pt 2), 287–307. doi: 10.1348/000711007X193957
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### Other approaches for cognitive diagnosis

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### CDMs for polytomous data

- Chen, J., & de la Torre, J. (2018). Introducing the general polytomous diagnosis modeling framework. *Frontiers in psychology*, 9, 1474. doi: 10.3389/fpsyg.2018.01474
- Chen, J., & Zhou, H. (2017). Test designs and modeling under the general nominal diagnosis model framework. *PloS one*, 12(6), e0180016. doi: 10.1371/journal.pone.0180016
- Culpepper, S. A. (2019). An exploratory diagnostic model for ordinal responses with binary attributes: Identifiability and estimation. *Psychometrika*, 84(4), 921–940. doi: 10.1007/s11336-019-09683-4
- Ma, W. (2019a). A diagnostic tree model for polytomous responses with multiple strategies. *The British journal of mathematical and statistical psychology*, 72(1), 61–82. doi: 10.1111/bmsp.12137
- Ma, W., & de la Torre, J. (2016). A sequential cognitive diagnosis model for polytomous responses. *The British journal of mathematical and statistical psychology*, 69(3), 253–275. doi: 10.1111/bmsp.12070
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**CDMs for polytomous attributes**

- Chen, J., & de la Torre, J. (2013). A general cognitive diagnosis model for expert-defined polytomous attributes. *Applied Psychological Measurement*, 37(6), 419–437. doi: 10.1177/0146621613479818
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**CDMs for multiple strategies**

- de la Torre, J., & Douglas, J. A. (2008). Model evaluation and multiple strategies in cognitive diagnosis: An analysis of fraction subtraction data. *Psychometrika*, 73(4), 595–624. doi: 10.1007/s11336-008-9063-2
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**CDMs for options**

- de la Torre, J. (2009a). A cognitive diagnosis model for cognitively based multiple-choice options. *Applied Psychological Measurement*, 33(3), 163–183. doi: 10.1177/0146621608320523
- DiBello, L. V., Henson, R. A., & Stout, W. F. (2015). A family of generalized diagnostic classification models for multiple choice option-based scoring. *Applied Psychological Measurement*, 39(1), 62–79. doi: 10.1177/0146621614561315

**CDMs for longitudinal data**

- Chen, Y., Culpepper, S. A., Wang, S., & Douglas, J. (2018). A hidden markov model for learning trajectories in cognitive diagnosis with application to spatial rotation skills. *Applied Psychological Measurement*, 42(1), 5–23. doi: 10.1177/0146621617721250
- Madison, M. J., & Bradshaw, L. P. (2018). Assessing growth in a diagnostic classification model framework. *Psychometrika*, 83(4), 963–990. doi: 10.1007/s11336-018-9638-5
- Wang, S., Yang, Y., Culpepper, S. A., & Douglas, J. A. (2018). Tracking skill acquisition with cognitive diagnosis models: A higher-order, hidden markov model with covariates. *Journal of Educational and Behavioral Statistics*, 43(1), 57–87. doi: 10.3102/1076998617719727
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**Model estimation and identifiability**

- Chen, Y., Culpepper, S., & Liang, F. (2020). A sparse latent class model for cognitive diagnosis. *Psychometrika*. doi: 10.1007/s11336-019-09693-2
- da Silva, M. A., de Oliveira, E. S. B., von Davier, A. A., & Bazán, J. L. (2018). Estimating the DINA model parameters using the no-u-turn sampler. *Biometrical journal. Biometrische Zeitschrift*, 60(2), 352–368. doi: 10.1002/bimj.201600225
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- Xu, G., & Zhang, S. (2016). Identifiability of diagnostic classification models. *Psychometrika*, 81(3), 625–649. doi: 10.1007/s11336-015-9471-z
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- Liu, Y., Douglas, J. A., & Henson, R. A. (2009). Testing person fit in cognitive diagnosis. *Applied Psychological Measurement*, 33(8), 579–598. doi: 10.1177/0146621609331960
- Jiang, H. (1996). *Applications of computational statistics in cognitive diagnosis and IRT modeling* (Unpublished doctoral dissertation). University of Illinois at Urbana-Champaign.
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- Liu, Y., Tian, W., & Xin, T. (2016). An application of  $m_2$  statistic to evaluate the fit of cognitive diagnostic models. *Journal of Educational and Behavioral Statistics*, 41(1), 3–26. doi: 10.3102/1076998615621293

### Reliability

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- Wang, W., Song, L., Chen, P., Meng, Y., & DING, S. (2015). Attribute-level and pattern-level classification consistency and accuracy indices for cognitive diagnostic assessment. *Journal of Educational Measurement*, 52(4), 457–476. doi: 10.1111/jedm.12096
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### Model fit and person fit evaluation

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### Inferential model comparisons

- de la Torre, J., & Lee, Y.-S. (2013). Evaluating the wald test for item-level comparison of saturated and reduced models in cognitive diagnosis. *Journal of Educational Measurement*, 50(4), 355–373. doi: 10.1111/jedm.12022
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### Methods for Q-matrix

- Chen, J. (2017). A residual-based approach to validate q-matrix specifications. *Applied Psychological Measurement*, 41(4), 277–293. doi: 10.1177/0146621616686021
- Chiu, C.-Y. (2013). Statistical refinement of the Q-matrix in cognitive diagnosis. *Applied Psychological Measurement*, 37(8), 598–618. doi: 10.1177/0146621613488436
- Culpepper, S. A., & Chen, Y. (2019). Development and application of an exploratory reduced reparameterized unified model. *Journal of Educational and Behavioral Statistics*, 44(1), 3–24. doi: 10.3102/1076998618791306
- DeCarlo, L. T. (2012). Recognizing uncertainty in the Q-matrix via a bayesian extension of the DINA model. *Applied Psychological Measurement*, 36(6), 447–468. doi: 10.1177/0146621612449069
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### CD-CAT

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- Wang, C., Chang, H.-H., & Douglas, J. (2012). Combining CAT with cognitive diagnosis: a weighted item selection approach. *Behavior research methods*, 44(1), 95–109. doi: 10.3758/s13428-011-0143-3
- Wang, C., Zheng, C., & Chang, H.-H. (2014). An enhanced approach to combine item response theory with cognitive diagnosis in adaptive testing. *Journal*

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- Zheng, C., & Wang, C. (2017). Application of binary searching for item exposure control in cognitive diagnostic computerized adaptive testing. *Applied Psychological Measurement*, 41(7), 561–576. doi: 10.1177/0146621617707509

### Applications

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