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 (icdms) and related methods. *Journal of Educational Measurement*, *44*(4), 377–383. doi: 10.1111/j.1745-3984.2007.00045.x
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- de la Torre, J., & Minchen, N. (2014). Cognitively diagnostic assessments and the cognitive diagnosis model framework. *Psicología Educativa*, *20*(2), 89–97. doi: 10.1016/j.pse.2014.11.001
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- Leighton, J. P., & Gierl, M. J. (2007). *Cognitive diagnostic assessment for education: Theory and applications*. Cambridge: Cambridge University Press.
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- Seipel, B., Biancarosa, G., Carlson, S. E., & Davison, M. L. (2018). The need, use, and future of cognitive diagnostic assessments in classroom practice. In V. C. X. Wang (Ed.), *Handbook of research on program development and assessment methodologies in k-20 education* (Vol. 2, pp. 1–23). Hershey PA: Information Science Reference. doi: 10.4018/978-1-5225-3132-6.ch001
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- Stout, W. (2007). Skills diagnosis using irt-based continuous latent trait models. *Journal of Educational Measurement*, *44*(4), 313–324. doi: 10.1111/j.1745-3984.2007.00041.x
- Tatsuoka, 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
- Chen, Y., Li, X., Liu, J., & Ying, Z. (2016). Regularized latent class analysis with application in cognitive diagnosis. *Psychometrika*. doi: 10.1007/s11336-016-9545-6
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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
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- 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

- Almond, R. G., & Zapata-Rivera, J.-D. (2019). Bayesian networks. In M. von Davier & Y.-S. Lee (Eds.), *Handbook of diagnostic classification models* (Vol. 51, pp. 81–106). Cham: Springer International Publishing. doi: 10.1007/978-3-030-05584-4_4

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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

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- Sun, J., Xin, T., Zhang, S., & de la Torre, J. (2013). A polytomous extension of the generalized distance discriminating method. *Applied Psychological Measurement*, *37*(7), 503–521. doi: 10.1177/0146621613487254

- Tu, D., Zheng, C., CAI, Y., Gao, X., & Wang, D. (2018). A polytomous model of cognitive diagnostic assessment for graded data. *International Journal of Testing*, *18*(3), 231–252. doi: 10.1080/15305058.2017.1396465

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CDMs for polytomous attributes

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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
- DiBello, L. V., Stout, W. F., & Roussos, L. (1995). Unified cognitive/psychometric diagnostic assessment likelihood-based classification techniques. In P. D. Nichols, S. F. Chipman, & R. L. Brennan (Eds.), *Cognitively diagnostic assessment* (pp. 361–390). Hills-dale, NJ:Erlbaum.
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- Ma, W., & Guo, W. (2019). Cognitive diagnosis models for multiple strategies. *The British journal of mathematical and statistical psychology*, *72*(2), 370–392. doi: 10.1111/bmsp.12155
- von Davier, M. (2010). Hierarchical mixtures of diagnostic models. *Psychological Test and Assessment Modeling*, *52*.

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
- Zhan, P., Jiao, H., Liao, D., & Li, F. (2019). A longitudinal higher-order diagnostic classification model. *Journal of Educational and Behavioral Statistics*, *44*(3), 251–281. doi: 10.3102/1076998619827593

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
- de la Torre, J. (2009b). Dina model and parameter estimation: A didactic. *Journal of Educational and Behavioral Statistics*, *34*(1), 115–130. doi: 10.3102/1076998607309474
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- Huebner, A., & Wang, C. (2011). A note on comparing examinee classification methods for cognitive diagnosis models. *Educational and Psychological Measurement*, *71*(2), 407–419. doi: 10.1177/0013164410388832
- Jiang, Z., & Carter, R. (2019). Using hamiltonian monte carlo to estimate the log-linear cognitive diagnosis model via stan. *Behavior research methods*, *51*(2), 651–662. doi: 10.3758/s13428-018-1069-9

- Jiang, Z., & Ma, W. (2018). Integrating differential evolution optimization to cognitive diagnostic model estimation. *Frontiers in Psychology*, *9*, 2142. doi: 10.3389/fpsyg.2018.02142

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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

- Zhan, P., Jiao, H., Man, K., & Wang, L. (2019). Using jags for bayesian cognitive diagnosis modeling: A tutorial. *Journal of Educational and Behavioral Statistics*, *44*(4), 473–503. doi: 10.3102/1076998619826040

Reliability

- Chen, Y., Liu, Y., & Xu, S. (2018). Mutual information reliability for latent class analysis. *Applied Psychological Measurement*, *42*(6), 460–477. doi: 10.1177/0146621617748324

- Johnson, M. S., & Sinharay, S. (2018). Measures of agreement to assess attribute-level classification accuracy and consistency for cognitive diagnostic assessments. *Journal of Educational Measurement*, *55*(4), 635–664. doi: 10.1111/jedm.12196

- 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

- Chen, F., Liu, Y., Xin, T., & Cui, Y. (2018). Applying the m2 statistic to evaluate the fit of diagnostic classification models in the presence of attribute hierarchies. *Frontiers in psychology*, *9*, 1875. doi: 10.3389/fpsyg.2018.01875

- Chen, J., de la Torre, J., & Zhang, Z. (2013). Relative and absolute fit evaluation in cognitive diagnosis modeling. *Journal of Educational Measurement*, *50*(2), 123–140. doi: 10.1111/j.1745-3984.2012.00185.x

- 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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- Ma, W. (2019b). Evaluating the fit of sequential g-dina model using limited-information measures. *Applied Psychological Measurement*, 014662161984382. doi: 10.1177/0146621619843829

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- Sen, S., & Bradshaw, L. (2017). Comparison of relative fit indices for diagnostic model selection. *Applied Psychological Measurement*, *41*(6), 422–438. doi: 10.1177/0146621617695521

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- Wang, C., Shu, Z., Shang, Z., & Xu, G. (2015). Assessing item-level fit for the dina model. *Applied Psychological Measurement*, *39*(7), 525–538. doi: 10.1177/0146621615583050

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
- Ma, W., Iaconangelo, C., & de la Torre, J. (2016). Model similarity, model selection, and attribute classification. *Applied Psychological Measurement*, *40*(3), 200–217. doi: 10.1177/0146621615621717
- Ma, W., & de la Torre, J. (2019a). Category-level model selection for the sequential g-dina model. *Journal of Educational and Behavioral Statistics*, *44*(1), 45–77. doi: 10.3102/1076998618792484
- Sorrel, M. A., de La Torre, J., Abad, F. J., & Olea, J. (2017). Two-step likelihood ratio test for item-level model comparison in cognitive diagnosis models. *Methodology*, *13*(Supplement 1), 39–47. doi: 10.1027/1614-2241/a000131
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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
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- de la Torre, J. (2008). An empirically based method of q-matrix validation for the dina model: Development and applications. *Journal of Educational Measurement*, *45*(4), 343–362. doi: 10.1111/j.1745-3984.2008.00069.x
- de la Torre, J., & Chiu, C.-Y. (2016). A general method of empirical q-matrix validation. *Psychometrika*, *81*(2), 253–273. doi: 10.1007/s11336-015-9467-8
- Liu, J., Xu, G., & Ying, Z. (2012). Data-driven learning of q-matrix. *Applied Psychological Measurement*, *36*(7), 548–564. doi: 10.1177/0146621612456591
- Lim, Y. S., & Drasgow, F. (2017). Nonparametric calibration of item-by-attribute matrix in cognitive diagnosis. *Multivariate behavioral research*, *52*(5), 562–575. doi: 10.1080/00273171.2017.1341829
- Ma, W., & de La Torre, J. (2020). An empirical q-matrix validation method for the sequential generalized dina model. *The British journal of mathematical and statistical psychology*, *73*(1), 142–163. doi: 10.1111/bmsp.12156
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CD-CAT

- Cheng, Y. (2009). When cognitive diagnosis meets computerized adaptive testing: Cd-cat. *Psychometrika*, *74*(4), 619–632. doi: 10.1007/s11336-009-9123-2
- Chen, P., Xin, T., Wang, C., & Chang, H.-H. (2012). Online calibration methods for the dina model with independent attributes in cd-cat. *Psychometrika*, *77*(2), 201–222. doi: 10.1007/s11336-012-9255-7
- Kaplan, M., de La Torre, J., & Barrada, J. R. (2015). New item selection methods for cognitive diagnosis computerized adaptive testing. *Applied Psychological Measurement*, *39*(3), 167–188. doi: 10.1177/0146621614554650
- 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 of Educational Measurement*, *51*(4), 358–380. doi: 10.1111/jedm.12057

- Xu, G., Wang, C., & Shang, Z. (2016). On initial item selection in cognitive diagnostic computerized adaptive testing. *The British journal of mathematical and statistical psychology*, *69*(3), 291–315. doi: 10.1111/bmsp.12072

- Yigit, H. D., Sorrel, M. A., & de La Torre, J. (2019). Computerized adaptive testing for cognitively based multiple-choice data. *Applied Psychological Measurement*, *43*(5), 388–401. doi: 10.1177/0146621618798665

- 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

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