

Angelos Markos

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Present Position, Work and Experience

Associate Professor, Dept. of Primary Education, Democritus Univ. of Thrace	2020 - present
Tutor, Hellenic Open University	2017 - present
Assistant Professor, Dept. of Primary Education, Democritus Univ. of Thrace	2014 - 2020
Visiting Scholar, Statistics Dept., Stanford University, California, USA	2017
Adjunct Lecturer, Dept. of Primary Education, Democritus Univ. of Thrace	2016
Lecturer, Dept. of Primary Education, Democritus Univ. of Thrace	2011 - 2014
Adjunct Lecturer, Dept. of Primary Education, Democritus Univ. of Thrace	2009 - 2010
Adjunct Lecturer, Dept. of Applied Informatics, Univ. of Macedonia	2009 - 2010
Research Associate, Dept. of Accounting, Tech. Educational Institute of Thessaloniki	2007 - 2008
Lab Associate, Dept. of Marketing, Tech. Educational Institute of Thessaloniki	2003 - 2007

Education

Ph.D. in Applied Informatics, University of Macedonia, Thessaloniki, Greece	2007
B.S. in Applied Informatics, University of Macedonia, Thessaloniki, Greece	2002

Research Interests

Clustering mixed type nominal/ordinal/interval data
Joint dimension reduction and clustering
Various collaborations in applied data analysis in educational psychology (personality, psychopathology), science education (student misconceptions), environmental education (ocean literacy), marketing (technology acceptance), computer science (recommender systems), applied linguistics.

Teaching

Undergraduate

Quantitative and Qualitative Data Analysis
Introductory Statistics
Multivariate Data Analysis
Measurement in Education

Postgraduate

Advanced Predictive Analytics and Data Mining
Educational Research Methods
Statistics & Data Analysis

Publications (by research topic)

Dimension reduction and Clustering

Greenacre, M., Groenen, P.J.F., Hastie, T., Iodice D'Enza, A., **Markos, A.**, & Tuzhilina, E. (2022). Principal Component Analysis. *Nature Reviews Methods Primers* (to appear)

Costa, E., Papatsouma, I., & **Markos, A.** (2022). Benchmarking distance-based partitioning methods for mixed-type data. *Advances in Data Analysis and Classification* <https://doi.org/10.1007/s11634-022-00521-7>

Moschidis, S., **Markos, A.**, & Thanopoulos, A. (2022). "Automatic" interpretation of Multiple Correspondence Analysis (MCA) results for non-expert users, using R programming. *Applied Computing and Informatics* <https://doi.org/10.1108/ACI-07-2022-0191>

Moschidis, O., **Markos, A.**, & Chadjipadelis, T. (2022). Hierarchical clustering of mixed-type data based on barycentric coding. *Behaviormetrika* <https://doi.org/10.1007/s41237-022-00165-z>

Iodice D'Enza, A., **Markos, A.** & Palumbo, F. (2022). Chunk-wise regularised PCA-based imputation of missing data. *Statistical Methods and Applications*, 31, 365–386.

Themelis, E., & **Markos, A.** (2021). A general nonparametric classification approach for cognitive diagnostic assessment in introductory statistics. In C. Davino, R. Fabricatore, A. Parola (Eds.), *Stat.Edu'21. New Perspectives in Statistics Education, Proceedings of the International Conference Stat.Edu'21*. March 25–26, 2021 Naples, Italy, pp. 22–28, FedOAPress.

Iodice D'Enza, A., Palumbo, F., & **Markos, A.** (2021). Single imputation via chunk-wise PCA. In B. Lausen, T. Chadjipadelis, A. Markos, T. R. Lee, A. Montanari, R. Nugent (Eds.), *Data Analysis and Rationality in a Complex World*, Studies in Classification, Data Analysis, and Knowledge Organization, pp. 75–82, Springer.

Pratsinakis, E. D., Karapetsi, L., Ntoanidou, S., **Markos, A.**, Madesis, P., Eleftherohorinos, I., & Menexes, G. (2021). Comparison of hierarchical clustering methods for binary data from SSR and ISSR molecular markers. In B. Lausen, T. Chadjipadelis, A. Markos, T. R. Lee, A. Montanari, R. Nugent (Eds.), *Data Analysis and Rationality in a Complex World*, Studies in Classification, Data Analysis, and Knowledge Organization, pp. 233–241, Springer.

Markos, A., Moschidis, O., & Chadjipantelis, T. (2020). Sequential Dimension Reduction and Clustering of Mixed-Type Datasets. *International Journal of Data Analysis Techniques and Strategies*, 12(3), 228–246.

Markos, A., Iodice D'Enza, A., & van de Velden, M. (2019). Beyond Tandem Analysis: Joint Dimension Reduction and Clustering in R. *Journal of Statistical Software*, 21(10), 1–24.

van de Velden, M., Iodice D'Enza, A., & **Markos, A.** (2018). Distance-based clustering of mixed data. *WIREs Computational Statistics*, 11(3), e1456.

Iodice D'Enza, A., **Markos, A.**, & Buttarazzi, D. (2018). idm: Incremental Decomposition Methods in R. *Journal of Statistical Software, Code Snippets*, 86(4), 1–24.

Markos, A. (2017). A Fuzzy Coding Approach to Data Processing Using the Bar. *Ratio Mathematica*, 33, 127–138.

Markos, A., & Iodice D'Enza, A. (2017). A Framework for the Incremental Update of the MCA Solution. *Italian Journal of Applied Statistics, Special Issue on Correspondence Analysis and Related*

Methods. Eds: S. Balbi, J. Blasius, & M. Greenacre, 29(2–3), 217–231.

Dramalidis, A., & **Markos, A.** (2016). Subset Multiple Correspondence Analysis as a Tool for Visualizing Affiliation Networks. *Journal of Data Analysis and Information Processing*, 4, 81–89.

Markos, A., & Iodice D’Enza, A. (2016). Incremental Generalized Canonical Correlation Analysis. In A. Wilhelm, A. Kestler (eds), *Analysis of Large and Complex Data, Studies in Classification, Data Analysis, and Knowledge Organization*, pp. 185–194, Springer. [Best Paper Award by the German Classification Society (GfKl), Second European Conference on Data Analysis, (ECDA)]

Iodice D’Enza, A., & **Markos, A.** (2015). Low-dimensional tracking of association structures in categorical data. *Statistics and Computing*, 25(5), 1009–1022.

Iodice D’Enza, A., & **Markos, A.** (2015). Incremental Visualization of Categorical Data. In I. Morlini, T. Minerva, M. Vichi (eds), *Advances in Statistical Models for Data Analysis, Studies in Classification, Data Analysis, and Knowledge Organization*, pp. 137–148, Springer.

Markos, A., Menexes, G., & Papadimitriou, I. (2010). The CHIC Analysis Software v1.0. In H. Loracek-Junge & C. Weihs (eds), *Classification as a Tool for Research, Proceedings of the 11th IFCS Conference*. pp. 409–416, Springer.

Menexes, G., **Markos, A.** & Papadimitriou, I. (2010). A method for adjusting the principal inertias of the Burt matrix in Multiple Correspondence Analysis. *Data Analysis Bulletin*, 11, 156–173. [In Greek]

Markos, A., Menexes, G., & Papadimitriou Th. (2009). Multiple Correspondence Analysis for “Tall” Data Sets. *Intelligent Data Analysis*, 13(6), 873–885.

Markos, A., Menexes, G. & Papadimitriou, I. (2008). The CHIC Analysis v1.0. software. *Data Analysis Bulletin*, 9, 19–30. [In Greek]

Markos, A., Menexes, G. & Papadimitriou, I. (2007). Software for Power Analysis in the context of Correspondence Analysis. *Data Analysis Bulletin*, 8, 9–22. [In Greek]

Menexes, G., **Markos, A.** & Papadimitriou, I. (2005). Confidence ellipses on Correspondence Analysis maps: Two approaches of their construction. *Data Analysis Bulletin*, 6, 26–46. [In Greek]

Markos, A., Menexes, G., & Papadimitriou, I. (2005). An algorithm for selecting the block of the Burt matrix resulting in the most similar representation to the one obtained by a Correspondence Analysis of the full Burt matrix. *Proceedings, 18th PanHellenic Statistics Conference*, (pp. 247–256).Greek Statistical Institute. [In Greek]

Menexes, G., **Markos, A.**, & Papadimitriou, I. (2005). Constructing confidence ellipses on Correspondence Analysis maps. *Proceedings, 18th PanHellenic Statistics Conference*, (pp. 257–265). Greek Statistical Institute. [In Greek]

Papadimitriou, I., & **Markos, A.** (2003). On the percentage of explained inertia in Correspondence Analysis. *Proceedings, 16th PanHellenic Statistics Conference*, (pp. 417–426), Greek Statistical Institute. [In Greek]

Test Validations and Adaptations

Kokkinos, C.M., **Markos, A.**, Michaelides, M., & Voulgaridou, I. (2020). Disentangling the factorial structure of the Greek Big Five Questionnaire for Children – Short Form. *Personality and Individual*

Differences, 156, 109742.

Mavrommatidou, S., Gavriilidou, Z., & **Markos, A.** (2019). Development and Validation of the Strategy Inventory for Electronic Dictionary Use (S.I.E.D.U.), *International Journal of Lexicography*, ecz015.

Markos, A., & Kokkinos, C.M. (2017). Development of a Short Form of the Greek Big Five Questionnaire for Children (GBFQ-C-SF): Validation among Preadolescents, *Personality and Individual Differences*, 112, 12–17.

Markos, A., Boubonari, T., Mogias, A. & Kevrekidis, T. (2017). Measuring Ocean Literacy in Pre-service Teachers: Psychometric Properties of the Greek Version of the Survey of Ocean Literacy and Engagement (SOLE). *Environmental Education Research*, 23(2), 231–251.

Antoniadou, N., Kokkinos, C.M., & **Markos, A.** (2016). Development, Construct Validation and Measurement Invariance of the Greek Cyber-Bullying/Victimization Experiences Questionnaire (CBVEQ-G). *Computers in Human Behavior*, 65C, 380–390.

Ter Mors, E., Terwel, B.W., Daamen, D.D.L. et al., (& **Markos, A.**) (2013). A Comparison of Techniques Used to Collect Informed Public Opinions about CCS: Opinion Quality After Focus Group Discussions Versus Information-Choice Questionnaires. *International Journal of Greenhouse Gas Control*, 18, 256–263.

Markos, A., Dramalidis, A. & Menexes, G. (2013). Student response patterns and scale usage heterogeneity in PISA 2006 Science Interest scale. *Data Analysis Bulletin*, 13, 114–126.

Educational/School Psychology (as Statistical Collaborator)

Voulgaridou, I., Kokkinos, C.M., & **Markos, A.** (2022). Is Relational Aggression a Means of Pursuing Social Goals among Adolescents with Specific Personality Traits? *Psychology in the Schools*, 1–18.

Kokkinos, C.M., Kipritsi, E., Voulgaridou, I., & **Markos, A.** (2022). Reactive and Proactive Aggression Subgroups in Early Adolescents and the Interplay among Callous-unemotional Traits, Moral Disengagement, Empathy and Functions of Aggression. *Current Psychology*, 41, 3551–3564.

Kokkinos, C.M., Voulgaridou, I., **Markos, A.**, & Fanti, K. (2022). Temporal Stability of Relational Aggression Profiles in Adolescents. *Journal of School Psychology*, 92, 19–32.

Kokkinos, C.M. Kountouraki, M., Voulgaridou, I., & **Markos, A.** (2020). Understanding the Association Between Big Five and Relational Aggression: The Mediating Role of Social Goals and Friendship Jealousy. *Personality and Individual Differences*, 160, 109946.

Antoniadou, N., Kokkinos, K., & **Markos, A.** (2019). Psychopathic Traits and Social Anxiety in Cyber-Space: A Context-Dependent Theoretical Framework Explaining Online Disinhibition. *Computers in Human Behavior*, 99, 228–234.

Bibou, I., **Markos, A.**, Ververidou, S., Chatzilampou, P., & Padelia, S. (2019). Multi-informant evaluation of students' psychosocial status through SDQ in a national Greek sample. *Children and Youth Services Review*, 96, 47–54.

Bibou, I., & **Markos, A.** (2017). Greek teachers' experience and perceptions of child abuse/neglect. *Advances in School Mental Health Promotion*, 4, 265–282.

- Kokkinos, C.M., Kirpitsi, E., & **Markos, A.** (2016). Preadolescents' Psychosocial Functioning: The Role of Personality and Attachment Style, *Mental Health & Prevention*, 4(3), 105–114.
- Kokkinos, C.M., Voulgaridou, I., & **Markos, A.** (2016). Personality and Relational Aggression: Moral Disengagement and Friendship Quality as Mediators, *Personality and Individual Differences*, 95, 74–79.
- Antoniadou, N., Kokkinos, C.M., & **Markos, A.** (2016). Possible Common Correlates between Bullying and Cyber-Bullying among Adolescents, *Psicologia Educativa*, 22, 27–38.
- Kokkinos, C., Voulgaridou, I., Koukoutsis, N., & **Markos, A.** (2015). Peer Victimization and Depression in Greek Preadolescents: Personality and Attachment as Moderators. *Personal Relationships*, 23(2), 280–295.
- Kokkinos, C.M., Kargiotidis, A., & **Markos, A.** (2015). The Relationship between Learning and Study Strategies and Big Five Personality Traits among Junior University Student Teachers. *Learning and Individual Differences*, 43, 39–47.
- Antoniadou, N., Kokkinos, C.M., & **Markos, A.** (2014). Cyber-bullying: An investigation of the psychological profile of University student participants. *Journal of Applied Developmental Psychology*, 35(3), 204–214. (featured at OpenForest.net <https://goo.gl/C6aMv3>)
- Bibou-Nakou, I., & **Markos, A.** (2013). Coping strategies of secondary school children experiencing bullying: frequency and type of bullying. School Bullying: Predictive Factors. In K. Dekker, M. Dijkstra (eds), *Coping Strategies and Effects on Mental Health*, pp. 69–96, Nova Publishers.
- Efthymiou, A., Fragaki, G., & **Markos, A.** (2012). Productivity of verb forming suffixes in Modern Greek: A corpus-based study. *Morphology*, 22(4), 515–543.
- Sakka, D., & **Markos, A.** (2013). From the adolescents' perspective: Aggression and violence at school in relation to ethnicity and gender. In V. Deligianni-Kouimtzi, E. Gonida, E. Figgou, A. Baka & D. Moraitou (Eds) *Scientific Annals - School of Psychology AUTH* Vol. I. (127–162) [In Greek]
- Brouskeli, V., & **Markos, A.** (2013). The Role of Locus of Control and Perceived Stress in Dealing with Unemployment during Economic Crisis. *Research on Humanities and Social Sciences*, 21(3), 95–102.

Business & Marketing (as Statistical Collaborator)

- Saprikis, V., Vlachopoulou, M., & **Markos, A.** (2021). Modelling consumers' payment behaviour towards contactless cards. *International Journal of Business Information Systems*, 38(3), 393–417.
- Saprikis, V., & **Markos, A.** (2018). Modeling Users' Acceptance of Social Commerce. *International Journal of E-Business Research*, 14(4), 28–50.
- Saprikis, V., **Markos, A.**, Zarpou, T., & Vlachopoulou, M. (2018). Mobile shopping consumers' behavior: An Exploratory Study and Review. *Journal of Theoretical and Applied Electronic Commerce Research*, 13(1), 71–90.
- Zarpou, T., Saprikis, V., **Markos, A.**, & Vlachopoulou, M. (2012). Modeling Users' Acceptance of Mobile Services. *Electronic Commerce Research*, 12(2), 225–248. [7th most cited article published in ECR between 2001 and 2020, <https://link.springer.com/article/10.1007/s10660-021-09464-1>]

Kitsiou, S., Manthou, V., Vlachopoulou, M., & **Markos, A.** (2010). Adoption and sophistication of clinical information systems in Greek public hospitals: Results from a national web-based survey. In *XII Mediterranean Conference on Medical and Biological Engineering and Computing*, Springer Berlin / Heidelberg, pp. 1011–1016.

Patsioura, F., Kitsiou, S., & **Markos, A.** (2009). Evaluation of Greek Public Hospital Websites. In J. Filipe, D. A. Marca, B. Shishkov, and M. van Sinderen (eds), In *Proc. of the International Conference on e-Business (ICE-B 2009)*, INSTICC Press, pp. 223–229.

Papadimitriou, I., & **Markos, A.**, & Fragkaki, M. (2005). The Greek trade with the EU from 1990 to 2003, with emphasis on Fruits – Vegetables and Oil - Fats. Proceedings, Scientific Congress “New Technologies & Marketing”, (pp. 76–82). [In Greek]

Math & Science Education (as Statistical Collaborator)

Zarkadis, N., Papageorgiou, G. & **Markos, A.** (2022). Incorporating quantum number characteristics in the pictorial representations of the atomic structure. Consistency issues and students’ relevant profiles. *Science Education International*, 33(1), 93–101.

Tsaousi, A., & **Markos, A.** (2021). Content validity assessment of ALEAS statistical reasoning items via think-aloud interviews. In C. Davino, R. Fabricatore, A. Parola (Eds.), *Stat.Edu’21. New Perspectives in Statistics Education, Proceedings of the International Conference Stat.Edu’21*. March 25-26, 2021 Naples, Italy, pp. 38–44, FedOAPress.

Zarkadis, N., Papageorgiou, G. & **Markos, A.** (2021). Understanding Quantum Numbers: Students’ verbal descriptions and pictorial representations of the atomic structure. *International Journal of Science Education*, 43(13), 2250–2269.

Zarkadis, N., Papageorgiou, G., & **Markos, A.** (2019). Atomic structure – the effects of two cognitive factors on secondary students’ understanding of the ‘orbital’ and ‘electron cloud’ concepts. In Levrini, O. & Tasquier, G. (Eds.), **Electronic Proceedings of the ESERA 2019 Conference**. The beauty and pleasure of understanding: engaging with contemporary challenges through science education, Part 1 (co-ed. Anna De Ambrosis & Odilla Finlayson), (pp. 78–86). Bologna: ALMA MATER STUDIORUM – University of Bologna. 978-88-945874-0-1978-88-945874-0-1

Angeloudi, A., Papageorgiou, G., & **Markos, A.** (2018). Primary students’ argumentation on factors affecting dissolving. **Science Education International**, 29(3), 127–136.

Papageorgiou, G., **Markos, A.**, & Zarkadis, N. (2017). Understanding the atom and relevant misconceptions. Students’ profiles in relation to three cognitive variables. *Science Education International*, 27(4), 464–488.

Stamovlasis, D., **Markos, A.**, & Papageorgiou, G. (2017). A comparative contribution of dissimilarity-based clustering and latent class analysis in science education research: The case of children’s mental model of the Earth, Proceedings, In *Proceedings of 9th PanHellenic Conference on Science Education & ICT Education*, (pp. 160–166). [In Greek]

Papageorgiou, G., **Markos, A.**, & Zarkadis, N. (2016). Students’ representations of the atomic structure – The effect of some individual differences in particular task contexts. *Chemistry Education Research and Practice*, 17, 209–219.

Dramalidis, A., & **Markos, A.** (2016). Assessing mathematical proficiency needed for primary education students an introductory statistics course to successfully complete. *Data Analysis Bulletin*,

17, 14–25. [In Greek]

Dramalidis, A., **Markos, A.**, & Sakonidis, H. (2016). Mathematics achievement of Muslim Minority children in Thrace aged 11-16 years. *Data Analysis Bulletin*, 17, 65–83. [In Greek]

Mogias, A., Boubonari, T., **Markos, A.**, & Kevrekidis T. (2015). Greek pre-service teachers' knowledge of ocean sciences issues and attitudes towards ocean stewardship. *The Journal of Environmental Education*, 46(4), 251–270.

Zarkadis, N., Papageorgiou, G., & **Markos, A.** (2015). Representations of the atomic structure -The effect of individual differences on secondary school students' understanding, In *Proceedings of 9th PanHellenic Conference on Science Education & ICT Education*, (pp. 559–564). [In Greek]

Dramalidis, A., & **Markos, A.** (2014). An investigation of factors associated with performance in placement exams of a Primary Education Department. *Data Analysis Bulletin*, 16, 104–113. [In Greek]

Boubonari, T., **Markos, A.**, & Kevrekidis, T. (2013). Greek pre-service teachers knowledge, attitudes and environmental behavior towards marine pollution. *The Journal of Environmental Education*, 44(4), 232–251.

Zarkadis, N., Papageorgiou, G., & **Markos, A.** (2013). Representations of the atomic structure – A cross-age study in secondary school students. In *Proceedings of 8th PanHellenic Conference on Science Education & ICT Education*, (pp. 370–377). [In Greek]

Dramalidis, A., **Markos, A.**, Sakonidis, H., Papageorgiou, G., & Fachiridis, G. (2012). Social and educational characteristics of perspective primary teachers: tracing changes during the last two decades. *Data Analysis Bulletin*, 13, 175–190. [In Greek]

Dramalidis, A., **Markos, A.**, & Sakonidis, H. (2009). Mathematics performance of secondary school students: An investigation of socio-educational factors. In *Proceedings of the 20th PanHellenic Statistics Conference*, (pp. 75–82). Greek Statistical Institute. [In Greek]

Applied Linguistics (as Statistical Collaborator)

Gavriilidou, Z., **Markos, A.**, & Dourou, C. (2022). The interaction of variables affecting definitional skills: extending previous research on word definitions. *Journal of Language and Education*, 8(3), 68–83.

Gavriilidou, Z., Mavrommatidou, S., & **Markos, A.** (2020). The effects of gender, age and career orientation on digital dictionary use strategies. *International Journal of Research Studies in Education*, 9(6), 63–76.

Chadjipapa, E., Gavriilidou, Z., **Markos, A.**, & Mylonopoulos, A. (2020). The effect of gender and educational level on dictionary use strategies adopted by upper elementary and lower secondary students attending Greek Schools. *International Journal of Lexicography*, ecaa012.

Dourou, C., Gavriilidou, Z., & **Markos, A.** (2020). Definitional Skills and Preferred Definition Types according to Age, Gender, Educational Level and Career Orientation. *International Journal of Research Studies in Education*, 9(2), 29–49.

Efthymiou, A., Fragaki, G. & **Markos, A.** (2015). Exploring the polysemy of the Modern Greek prefix iper-. *Morphology*, 25(4), 411–438.

Efthymiou, A., Fragaki, G., & **Markos, A.** (2015). Exploring the meaning and productivity of a polysemous prefix: The case of the Modern Greek prepositional prefix para-. *Acta Linguistica Hungarica*, 62(4), 447–476.

Kambaki-Vougioukli, P., & **Markos, A.** (2015). Greek philology students' self-reported knowledge of dialects/idioms with the use of the response bar. In G. Kotzoglou, K. Nikolou. E. Karatzola, K. Frantzi, I. Galantomos, M. Georgalidou, V. Kourti-Kazoullis, Ch. Papadopoulou, E. Vlachou (eds), *Selected Papers of the 11th International Conference of Greek Linguistics*. Rhodes: University of the Aegean, 645–657. [In Greek]

Efthymiou, A., Fragaki, G. & **Markos, A.** (2015). Aspects of productivity of the Modern Greek prefix iper-: A corpus-based study. In G. Kotzoglou, K. Nikolou. E. Karatzola, K. Frantzi, I. Galantomos, M. Georgalidou, V. Kourti-Kazoullis, Ch. Papadopoulou, E. Vlachou (eds), *Selected Papers of the 11th International Conference of Greek Linguistics*. Rhodes: University of the Aegean, 37300383.

Efthymiou, A., Fragaki, G. & **Markos, A.** (2012). Exploring the productivity of -pio in Modern Greek: A corpus-based study. In Z. Gavriilidou, A. Efthymiou, E. Thomadaki, P. Kambaki Vougiouklis (eds), *Selected papers of the 10th International Conference of Greek Linguistics*. Komotini: Democritus University of Thrace, 243–254.

Computer Science (Recommender Systems)

Vozalis, M., **Markos, A.**, & Margaritis, K. (2012). An Optimal Scaling Framework for Collaborative Filtering Recommendation Systems. *International Journal on Artificial Intelligence Tools*, 21(6), 1–26.

Vozalis, M.G., **Markos, A.**, & Margaritis, K.G. (2010). Collaborative Filtering through SVD-Based and Hierarchical Nonlinear PCA. In K. Diamantaras, W. Duch, L.S. Iliadis (eds), *ICANN 2010*, Part I, LNCS 6352, pp. 395–400.

Markos, A., Vozalis, M., & Margaritis, K.G. (2010). An Optimal Scaling Approach to Collaborative Filtering using Categorical Principal Component Analysis and Neighborhood Formation. In H. Papadopoulos, A.S. Andreou, M. Bramer (eds), *AIAI 2010*, IFIP AICT 339, Springer Berlin / Heidelberg, pp. 22–29.

Vozalis, M., **Markos, A.**, & Margaritis, K.G. (2009). On the Performance of SVD-based Algorithms for Collaborative Filtering. In *Proceedings of the 4th Balkan Conference in Informatics*, IEEE Press, ISBN: 978-0-7695-3783-2, pp. 245–250.

Vozalis, M.G., **Markos, A.I.**, & Margaritis, K.G. (2009). A Hybrid Approach for Improving Prediction Coverage of Collaborative Filtering. In L. Iliadis, I. Vlahavas, M. Bramer (eds), *AIAI 2009*, IFIP Vol. 296, Springer Boston, pp. 491–498.

Vozalis, M., **Markos, A.**, & Margaritis, K.G. (2009). Evaluation of standard SVD-based techniques for Collaborative Filtering. In *Proc. 9th Hellenic European Research on Computer Mathematics and its Applications Conference*, HERCMA09.

Medical & Biological Sciences (as Statistical Collaborator)

Kevrekidis, D., Mináriková, D. & **Markos, A.** (2021). Effects of Demographic Characteristics and Consumer Behavior in the selection of Retail Pharmacies and Over-the-Counter Medicine. *European Pharmaceutical Journal*, 68(2) 27–40.

Kevrekidis, D.-P., Mináriková, D., **Markos, A.**, Malovecka, I., & Minarik, P. (2017). Community pharmacy customer segmentation based on factors influencing their selection of pharmacy and over-the-counter medicines, *Saudi Pharmaceutical Journal*, 26(1), 33–43.

Alexiadis, G., Panagoutsos, S., Roumeliotis, S., Stibiris, I., **Markos, A.**, Kantartzi, K., & Pasadakis, P. (2017). Comparison of multiple fluid status assessment methods in patients on chronic hemodialysis, *International Urology and Nephrology*, 49(3), 525–532.

Menexes, G., **Markos, A.**, Korpetis, E., Koutsos, T., & Mavromatis, A. (2017). Ranking of Genotypes based on multiple relative criteria: a methodological proposal, In *Proceedings, 12th Panhellenic Conference of the Hellenic Scientific Society for Genetics and Plant Breeding*. [In Greek]

Triantafillidou, K., Venetis, G., & **Markos, A.** (2012). Short term results of autologous blood injection for treatment of habitual TMJ luxation. *Journal of Craniofacial Surgery*, 23(3), 689–692.

Menexes, G., **Markos, A.**, & Farmakis, N. (2012). Index for measuring the convergence between groups of data and a target (reference) data table: application to energy inputs-outputs tabled data of selected agro-ecosystems. *Data Analysis Bulletin*, 13, 28–44. [In Greek]

Menexes, G., Bladenopoulos, K., & **Markos, A.** (2012). A method for ranking a large number of cereal lines. *Data Analysis Bulletin*, 13, 86–98. [In Greek]

Pietzner, K., Schumann, D., Tvedt, S., Torvatn, H., Næss, R., Reiner, D., Anghel, S., Cismaru, D., Constantin, C., Daamen, D., Dudu, A., Esken, A., Gemeni, V., Ivan, L., Koukouzas, N., Kristiansen, G., **Markos, A.**, et al. (2011). Public awareness and perceptions of carbon dioxide capture and storage (CCS): Insights from surveys administered to representative samples in six European countries. *Energy Procedia*, 4, 6300–6306.

Daamen, D., Terwel, B., Ter Mors, E., Reiner, D., Schumann, D., Anghel, S., Boulouta, I., Cismaru, D., Constanstin, C., De Jager, C., Dudu, A., Firth, R., Gemeni, V., Hendriks, C., Koukouzas, N., **Markos, A.**, et al. (2011). Scrutinizing the impact of CCS communication on opinion quality: Focus Group Discussions versus Information-Choice Questionnaires: Results from experimental research in six countries. *Energy Procedia*, 4, 6182–6187.

Other (as Statistical Collaborator)

Theodosiadou, S., & **Markos, A.** (2013). Attitudes of preschool teachers in Northern Greece on children and TV viewing. *Australasian Journal of Early Childhood*, 38(3), 36–44.

Papadimitriou, I., & **Markos, A.** (2003). Citizens' attitudes towards EXPO 2008 in Thessaloniki. *Data Analysis Bulletin*, 4, 163–170. [In Greek]

PhD Thesis

Markos, A. (2006). *Interpretation of Correspondence Analysis: algorithms, indices and data input* Doctoral Thesis, Submitted to the Dept. of Applied Informatics, University of Macedonia, Thessaloniki, Greece (with honours).

Textbooks (translation/academic editing)

Albano, T. (2022). *Introduction to Educational and Psychological Measurement Using R* (**A. Markos**, Trans.). Athens: Kallipos, Open Academic Editions. <http://hdl.handle.net/11419/8143>

Tittle, N., Chance, B. L., Cobb, G. W., Rossman, A. J., Roy, S., Swanson, T., & VanderStoep, J. (2021). *Introduction to statistical investigations* (A. Markos et al., Academic Editor). John Wiley & Sons.

Course Notes

Markos, A. (2016). *Quantitative Methods in the Social Sciences* (179 pages) [In Greek]

Markos, A. (2012). *Assessing reliability and validity of psychometric scales with IBM SPSS Statistics* (12 pages). [In Greek]

Markos, A. (2012). *Reliability and validity of psychometric scales* (41 pages). [In Greek]

Software

Author, co-author and/or maintainer of the following software packages or scripts:

clustrd (with A. Iodice D'Enza & M. van de Velden). Methods for Joint Dimension Reduction and Clustering. Software presented in the 9th Scientific Meeting of the Classification and Data Analysis Group of the Italian Statistical Society, September 2013, Modena, Italy. URL: <http://cran.r-project.org/web/packages/clustrd/clustrd.pdf>

caGUI A Graphical User Interface (GUI) for the R package ca of Nenadic & Greenacre (2007). idm (with A. Iodice D'Enza & D. Buttarazzi). Incremental Decomposition Methods in R (incremental versions of Principal Component Analysis and Multiple Correspondence Analysis). URL: <http://cran.r-project.org/web/packages/idm/idm.pdf>

CFA in lavaan with examples A collection of R scripts implementing the examples used in T. Brown's (2006) book: *Confirmatory Factor Analysis for Applied Research*. URL: <http://www.amarkos.gr/research/lavaan>

CHIC Analysis (Correspondence and Hierarchical Cluster Analysis Software). Correspondence Analysis and Hierarchical Clustering Software (Delphi and Matlab). It implements a series of proposals aiming to help the interpretation of Simple and Multiple Correspondence Analysis. URL: <http://www.amarkos.gr/research/chic>

Procrustes Software in Delphi & Matlab for Procrustes Analysis Power Analysis for AFC Power Analysis in the context of Correspondence Analysis (Excel Add-on)

Conferences, Workshops, Seminars

Selected Presentations

Costa, E., Papatsouma, I., & **Markos, A.** (2022). Distance-based partitioning of mixed-type data: which method to choose? European Conference on Data Analysis (ECDA 2022), September 14–17, 2022, Naples, Italy.

Markos, A., Iodice D'Enza, & van de Velden, M. (2021). Outlier Identification in Joint Dimension Reduction and Clustering. 63rd ISI World Statistics Congress, July 11–16, 2021 (virtual event).

Markos, A., Moschidis, O., Menexes, G., & Chatzipantelis, T. (2018). On the performance of distance-based approaches for clustering mixed-type data. 23rd International Conference on Computational Statistics (COMPSTAT 2018), August 28–31, 2018, Iasi, Romania.

Markos, A. & Iodice D'Enza, A. (2016). A comparison of incremental Multiple Correspondence Analysis approaches for high-dimensional data. International Conference on Information Complexity and Statistical Modeling in High Dimensions with Applications (IC-SMHD-2016), May 18–21, 2016, Cappadocia, Turkey.

Markos, A., & Iodice D'Enza, A. (2015). Joint dimension reduction and fuzzy clustering. The 7th CARME (Correspondence Analysis and Related Methods) Conference, September 20–23, 2015, Naples, Italy.

Iodice D'Enza, A., & **Markos, A.** (2015). [Invited Speaker]. SVD computation and updating for large data sets. Workshop on Singular Value Decomposition (SVD) after CARME 2015 conference, September 24–25, 2015, Procida Italy.

Markos, A. & Iodice D'Enza, A. (2014). Incremental Generalized Canonical Correlation Analysis. 2nd European Conference on Data Analysis (ECDA 2014), July 2–4, 2014, Bremen, Germany.

Markos, A., Iodice D'Enza, A., & van de Velden, M. (2013). Beyond tandem analysis: joint dimension reduction and clustering in R. 9th Scientific Meeting of the Classification and Data Analysis Group of the Italian Statistical Society, September 18–20, 2013, Modena, Italy.

Markos, A., & Menexes, G. (2011). Hierarchical Clustering on Special Manifolds. The 6th CARME (Correspondence Analysis and Related Methods) Conference, February 8–11, 2011, Rennes, France.

Markos, A. (2011). Student response patterns and scale usage heterogeneity in PISA 2006 science interest scales. 1st International Workshop on Correspondence Analysis and Related Methods (CARME), October 2011, Assos, Turkey.

Markos, A.I., Vozalis, M. G. & Margaritis, K. G. (2010). An Optimal Scaling Approach to Collaborative Filtering using Categorical Principal Component Analysis and Neighborhood Formation. 6th IFIP Conference on Artificial Intelligence, Applications & Innovations (AIAI 2010), 6–7 October, 2010, Larnaca, Cyprus.

Markos, A., Menexes, G., Papadimitriou, I. (2010). The CHIC Analysis Software v1.0. In: Locarek-Junge, H., Weihs, C. (eds) *Classification as a Tool for Research*. Studies in Classification, Data Analysis, and Knowledge Organization. Springer, Berlin, Heidelberg.

Reviewer and Editorial activities

Editorial Activities

Co-editor of the Volume: Chadjipadelis, T., Lausen, B., **Markos, A.**, Lee, T. R., Montanari, A., & Nugent, R. (Eds.). (2021). *Data Analysis and Rationality in a Complex World*. Springer Nature. <https://www.springer.com/gp/book/9783030601034>

Co-editor of the Special Issue: Iodice D'Enza, A., & **Markos, A.** (2023). Advances in behavioural data science. *Behaviormetrika*. <https://www.springer.com/journal/41237/>

Co-editor of the Special Issue: Menexes, G., & **Markos, A.** (2023). Design and Statistical Analysis in Agricultural, Biological and Environmental Sciences. *Agronomy*. <https://www.mdpi.com/si/148508>

Journal Editorial Boards

[Data Analysis Bulletin](#) (Tetradia Analysis Dedomenon), journal published biennially by the Greek

Society of Data Analysis.

Scientific Distinction and Recognition of Scientific Work

A) Special Invited Talks & Workshops

Workshop on *Joint Dimension Reduction and Clustering in Practice* November 29, 2021, 62nd Annual Conference of the South-African Statistical Association, Stellenbosch University, South Africa (online).

Lecture on *Categorical Data Clustering* (with Alfonso Iodice D'Enza) as part of the course *Math 285 Cluster Analysis and Applications*, MS Statistics program, Department of Mathematics and Statistics, San Jose State University, March 6, 2017, San Jose California, USA.

Workshop on *Singular Values Decomposition computation and updating for large data sets* (with Alfonso Iodice D'Enza), October 24–25, 2015, Procida, Italy.

B) Awards and Distinctions

Theory Award by the German Classification Society (GfKI) for our paper presented in the 2nd European Conference in Data Analysis:

Markos, A., & Iodice D'Enza, A. (2016). Incremental Generalized Canonical Correlation Analysis. In A. Wilhelm, A. Kestler (eds), *Analysis of Large and Complex Data, Studies in Classification, Data Analysis, and Knowledge Organization*, pp. 185–194, Springer.

Funded Research Projects

Principal Investigator or Research Collaborator

01.09.2018 – 31.03.2021: Principal Investigator of the applicant Democritus University of Thrace. ALeaS: Adaptive Learning in Statistics Erasmus+ Key Action 2: Cooperation for innovation and the exchange of good practices. Budget: 375.000EUR.

11.10.2017 – 30.06.2018: Survey design and data analysis, Connected Cars, Connected Audience, News Ecosystem. Funded by Google Digital News Initiative Innovation Fund. Project coordinator: Assistant Prof. Nikos Panagiotou, Aristotle University of Thessaloniki.

2015 – 2017: Data analyst-psychometrician, Adaptation and standardization of the Weschler Intelligence Scale – V in the Greek population. Project Coordinator: Prof. A. Stogiannidou, Aristotle University of Thessaloniki.

2011 – 2016: Data analyst, Practicum in the Dept. of Primary Education, University of Thrace (MIS 299940) Evaluation report of students' practicum in the Department of Primary Education: Results of data analysis of student questionnaires. Coordinating Institution: Democritus University of Thrace.

01.09.2013 – 31.12.2013: Data analyst, Program for Immigration and Intercultural Education (MIS 300607): Evaluation report - results of an intervention program. Coordinating Institution: University of Thessaly.

09.05.2011 – 31.12.2012: Instructor, Training in-service teachers for the integration and use of ICT in education. Coordinating Institution: Technological Educational Institute of Kavala.

01.04.2011 – 15.05.2011: Data analyst, Nationwide survey on education regarding alcohol abuse. University of Macedonia Research Institute.

01.02.2011 – 11.04.2011: Data analyst, Patient satisfaction survey for the services of the Drug Prevention Centre in Thessaloniki. University of Macedonia Research Institute.

30.04.2010 – 30.06.2010: Data analyst, Job satisfaction survey among employees of Papageorgiou Hospital in Thessaloniki. University of Macedonia Research Institute.

01.03.2010 – 30.04.2010: Data analyst, Consumer confidence survey for the first semester of 2010. University of Macedonia Research Institute.

14.09.2010 – 13.11.2010: Data analyst, Consumer confidence survey for the first semester of 2010. University of Macedonia Research Institute.

01.03.2009 - 31.03.2010: Data analyst, FENCO-ERA project Scrutinizing the impact of CCS communication on the general and local public. University of Macedonia Research Institute.

13.10.2008 – 31.12.2008: Research Project (No. 50105) A proposal of indices for improving the measurement of socio-economic variables. Department of Mathematics, Coordinating Institution: Aristotle University of Thessaloniki.

01.02.2008 – 31.12.2008: Data analyst, Leonardo da Vinci Project: IMPROHEALTH COLLABORATIVE Vocational Education and Training for Quality of Life Through eHealthcare & Well-Being No SK.03.B.F.PP -177014. Coordinating Institution: University of Macedonia.

08.02.2007 – 07.02.2008: Data analysis software developer, EPEAEK Project: Revising the Curriculum of the Department of Applied Informatics. Coordinating Institution: University of Macedonia.

01.01.2006 – 30.01.2006: Data analyst, Pythagoras II Project: Strengthening research teams at the University of Macedonia. Coordinating Institution: University of Macedonia.

01.12.2004 – 31.08.2005: Data analysis software developer, EPEAEK II Project: Revising the Curriculum of the Department of International Economic Relations and Development. Coordinating Institution: Democritus University of Thrace.

29.01.2004 – 31.12.2004: Data analysis software developer, EPEAEK Project: Revising the Curriculum of the Department of Applied Informatics. Coordinating Institution: University of Macedonia.

2003: Researcher, Development of educational material and multimedia applications, Coordinating Institution: National Agricultural Research Foundation (N.A.R.F.).

Further Academic Activities

Scientific Societies - Associations

Council Member (Additional) of the International Federation of Classification Societies (IFCS), <https://ifcs.boku.ac.at/site/doku.php> (2022 - 2026)

Elected Member of the International Statistical Institute (ISI), <https://www.isi-web.org/>

Member of the International Association for Statistical Computing (IASC-ISI), <http://iasc-isi.org/>

Member of the Centre for Multi-dimensional Data Visualisation, Department of Statistics and Actuarial Science, Stellenbosch University, South Africa <http://www.sun.ac.za/english/faculty/economy/MuViSU/>

Member of CARME-N (Correspondence Analysis and Related Methods – Network, <http://www.carme-n.org/>)

Council Member of the Greek Society of Data Analysis (<http://www.gsda.gr>) since 2009 and Treasurer since 2015. Representative to the IFCS (2011–2013).

Conference Scientific Programme Committees

CARME 2023, Correspondence Analysis and Related Methods, 26–29 September 2023, Bohn, Germany.

ECDA 2022, European Conference on Data Analysis, Naples, 14–16 September 2022, University of Naples Federico II, Naples, Italy.

IES 2022 - Innovation and Society 5.0: Statistical and Economic Methodologies for Quality Assessment (IASC Endorsed Event), 27–28 January 2022, Department of Economics, University of Campania “L. Vanvitelli”, Italy.

11th PanHellenic Conference of Data Analysis with International Participation, 28 September–02 October, 2022, Grevena, Greece.

Stat.Edu21 - New perspectives in Statistics Education, 25–26 March, 2021 (virtual event).

IFCS-2019, Symposium of the International Federation of Classification Societies (IFCS), 26–29 August 2019, Thessaloniki, Greece.

10th PanHellenic Conference of Data Analysis with International Participation, 26–29 August, 2019, Thessaloniki, Greece.

9th PanHellenic Conference of Data Analysis with International Participation, 28–30 September, 2017, Thessaloniki, Greece.

8th PanHellenic Conference of Data Analysis with International Participation, 10–12 September, 2015, Alexandroupoli, Greece.

IFCS-2013, Symposium of the International Federation of Classification Societies - IFCS, 14–17 July, 2013, Tilburg, The Netherlands.

7th PanHellenic Conference of Data Analysis with International Participation, 12–14 September, 2013, Kavala, Greece.

6th PanHellenic Conference of Data Analysis with International Participation, 8–11 September, 2011, Thessaloniki, Greece.

Conference Organization Committees

11th PanHellenic Conference of Data Analysis with International Participation, 28 September–02 October, 2022, Grevena, Greece.

IFCS-2019, Symposium of the International Federation of Classification Societies (IFCS), 26–29 August, 2019, Thessaloniki, Greece.

10th PanHellenic Conference of Data Analysis with International Participation, 26–29 August, 2019, Thessaloniki, Greece.

9th PanHellenic Conference of Data Analysis with International Participation, 28–30 September, 2017, Thessaloniki, Greece.

8th PanHellenic Conference of Data Analysis with International Participation, 10–12 September, 2015, Alexandroupoli, Greece.

7th PanHellenic Conference of Data Analysis with International Participation, 12–14 September, 2013, Kavala, Greece.

6th PanHellenic Conference of Data Analysis with International Participation, 8–11 September, 2011, Thessaloniki, Greece.

5th PanHellenic Conference of Data Analysis with International Participation, 10–12 September, 2009, Rethymno, Greece.

4th PanHellenic Conference of Data Analysis with International Participation, 13–15 September, 2007, Karditsa, Greece.

3rd PanHellenic Conference of Data Analysis with International Participation, 15–18 September, 2005, Sithonia Chalkidiki, Greece.

Ph.D. Student Supervision

Evipridis Themelis (2020) Non-parametric cognitive diagnostic models.

Katerina Tsaousi (2018) Measuring statistical reasoning in tertiary education.

Aphroditi Dimitriadou (2018) Statistics anxiety.

Research Metrics

orcid: <http://orcid.org/0000-0002-4204-3573>

Google Scholar: <https://scholar.google.com/citations?user=4Vr4OTIAAAAJ&hl=el>

Scopus: <https://www.scopus.com/authid/detail.uri?authorId=28767765700>

Web of Science: <https://www.webofscience.com/wos/author/record/1522724>

ResearchGate: https://www.researchgate.net/profile/Angelos_Markos2