

PD Dr. phil.
Stephan Getzmann

Curriculum Vitae

Education

1991 - 1999 Psychology, Universities of Duisburg and Wuppertal
1987 - 1993 Electrical Engineering, University of Duisburg

Degrees

2010 State doctorate (Habilitation) in Psychology
2004 Ph.D. (Dr. phil., summa cum laude)
1999 Diploma thesis in Psychology (with distinction)
1993 Diploma thesis in Electrical Engineering

Academic Career

2015 - present Head of networking group "Aging", Leibniz Research Centre for Working Environments and Human Factors – IfADo
2007 - 2015 Principal investigator ("Eigene Stelle" funded by the German Research Foundation) at IfADo research group "Aging" (Head M. Falkenstein)
2009 - 2010 Provisional professor at the Institute of Psychology, University of Duisburg-Essen
1999 - 2007 Research associate at the Faculty of Psychology at the University of Bochum (Head R. Guski)

Memberships

since 2019 European Cognitive Ageing Society (EUCAS),
Member of Scientific Board
since 2010 Deutsche Gesellschaft für Psychophysiologie und
ihre Anwendungen (DGPA)
since 2002 Deutschen Gesellschaft für Psychologie (DGPs)
since 2002 Fachgruppe Allgemeine Psychologie der DGPs

Funding

2021 - 2024	DFG: "Investigations on the influence of interruptions on attention and working memory performance in younger and older adults using EEG methodology" with D. Schneider, IfADo (281.230 €)
2021 - 2024	DFG: "Development and validation of audio-visual VR technology on the basis of experiments on auditory localization and attention in virtual and real 3D-spaces" with R. Martin, Ruhr-University Bochum (SPP 2236 AUDICTIVE, 351.200 €)
2018 - 2022	DFG: "Auditory scene analysis and attentional focusing in speech perception under complex dynamic listening conditions in younger and older adults" (238,409 €)
2017 - 2020	Leibniz Research Alliance Healthy Ageing: "Aging and mechanisms of learning and neural plasticity – from mice to men" in cooperation with FLI Jena and university partners (73,269 €)
2016 - 2023	BASSt DoBoLSiS: "Developing traffic safety-related personal characteristics of seniors: a 5-years longitudinal study" with G. Rudinger, uzbonn (748,121 €)
2015 - 2020	BMBF TRAIN-STIM: Subproject "Enhanced selective attention by optimized suppression of irrelevant sensory inputs by passive sensory learning, active training and Non-invasive Brain Stimulation in older adults". Co-PI with M. Falkenstein and J. Lewald (527,389 €)
2012 - 2015	DFG: "Auditory scene analysis and attentional focusing in speech perception under complex dynamic listening conditions in younger and older adults" (341,135 €)
2007 - 2012	DFG: "Investigation of cortical processing of auditory motion information using auditory evoked potentials" (191,240 €)
2007 - 2009	DFG: "Investigation of cortical processing of auditory motion information using auditory evoked potentials" (136,900 €)

Expert Reviews

- Reviews for the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG)
- Reviews for international and national journals:
Acta Acustica united with Acustica; Acta Psychologica; Aging, Neuropsychology and Cognition; Archives of Toxicology; Attention, Perception, & Psychophysics; Biological Psychology; Brain Research; Clinical Neurophysiology; Cognition; Developmental

Psychology; Ergonomics; European Journal of Cognitive Psychology; EXCLI Journal; Experimental and Clinical Sciences; Experimental Brain Research; Healthy Aging & Clinical Care in the Elderly; Hearing Research; IEEE Transactions on Multimedia; International Journal of Psychophysiology; Journal of Experimental Psychology: Applied; Journal of Experimental Psychology: Human Perception and Performance; Journal of Experimental Psychology: Learning, Memory, & Cognition; Journal of Neurophysiology; Journal of Neuroscience; Journal of Psychophysiology; Journal of the Acoustical Society of America; Neuropsychologia; Perception; PLoS ONE; Psychophysiology; Seeing and Perceiving; Scientific Reports; Visual Cognition; Zeitschrift für Verkehrssicherheit

Teaching

Since 2000 more than 50 courses in Cognitive Psychology, Work and Organizational Psychology, Ergonomics, and Psychology of Speech and Communication

Certificate "Professionelle Lehrkompetenz für die Hochschule" (professional training of the universities in North Rhine-Westphalia)

Certificate "Moderationsausbildung" (moderation training of the Ruhr-University Bochum)

Journal Articles (Peer Review)

2022

Begau, A., Klatt, L.-I., Wascher, E., Schneider, D. & Getzmann, S. (2022). Age influences audiovisual speech processing in multi-talker scenarios – evidence from cortical oscillations. In press in *European Journal of Neuroscience*.

Gajewski, P.D., Getzmann, S., Bröde, P., Burke, M., Cadenas, C., Capellino, S., Claus, M., Genç, E., Golka, K., Hengstler, J.G., Kleinsorge, T., Marchan, R., Nitsche, M.A., Reinders, J., van Thriel, C., Watzl, C. & Wascher, E. (2022). Dortmund Vital Study: a protocol of an interdisciplinary cross-sectional and longitudinal study to evaluate impact of biological and lifestyle factors on cognitive aging and work ability. *JMIR Research Protocols*, 11, e32352.

Getzmann, S., Arnau, S., Gajewski, P.D. & Wascher, E. (2022). Effects of auditory distraction on event-related potential correlates of time perception. *European Journal of Neuroscience*, 55, 121-137.

Kardys, C., Küper, K., Getzmann, S., Falkenstein, M. & Voelcker-Rehage, C. (2022). A comparison of the effects of short-term physical and combined multi-modal training on cognitive functions. *International Journal of Environmental Research and Public Health*, 19, 7506.

Klatt, L.-I., Getzmann, S. & Schneider, D. (2022). Attentional modulations of alpha power are sensitive to the task-relevance of auditory spatial information. *Cortex*, *153*, 1-20.

Metzen, D., Genç, E., Getzmann, S., Larra, M., Wascher, E. & Ocklenburg, S. (2022). Frontal and parietal EEG alpha asymmetry: A large-scale investigation of short-term reliability on distinct EEG systems. *Brain Structure and Function*, *227*, 725-740.

Wascher, E., Sharifian, F., Gutberlet, M., Schneider, D., Getzmann, S. & Arnau, S. (2022). Mental chronometry in big noisy data. *PloS one*, *17(6)*, e0268916.

2021

Begau, A., Klatt, L.-I., Wascher, E., Schneider, D. & Getzmann, S. (2021). Congruent lip movements facilitate speech processing in a dynamic audiovisual multitalker scenario: An ERP study with older and younger adults. *Behavioural Brain Research*, *412*, 113436.

Getzmann, S., Digutsch, J. & Kleinsorge, T. (2021). COVID-19 Pandemic and Personality: Agreeable people are more stressed by the feeling of missing. *International Journal of Environmental Research and Public Health*, *18*, 10759.

Getzmann, S., Reiser, J.E., Karthaus, M., Rudinger, G., & Wascher, E. (2021). Measuring correlates of mental workload during simulated driving using cEEGrid electrodes: a test–retest reliability analysis. *Frontiers in Neuroergonomics*, *2*, 729197.

Hanenberg, C., Schlüter, M.-C., Getzmann, S. & Lewald, J. (2021). Short-term audiovisual spatial training enhances electrophysiological correlates of auditory selective spatial attention. *Frontiers in Neuroscience*, *15*, 645702.

Karthaus, M., Wascher, E. & Getzmann, S. (2021). Distraction in the driving simulator: An ERP study with young, middle-aged, old and oldest drivers. *Safety*, *7*, 36.

Martin, F., Pinnow, M., Getzmann, S., Hans, S., Holtmann, M. & Legenbauer, T. (2021). Turning to the negative: Attention allocation to emotional faces in adolescents with dysregulation profile - an event-related potential study. *Journal of Neural Transmission*, *128*, 381-392.

Thönes, S., Wascher, E., Gajewski, P.D. & Getzmann, S. (2021). Time hurries on but does not fly in older age – no effect of depressive symptoms. *Timing & Time Perception*, *9*, 1-16.

Wascher, E., Reiser, J., Rinkenauer, G., Larra, M., Dreger, F., Schneider, D., Karthaus, M., Getzmann, S., Gutberlet, M. & Arnau, S. (2021). Neuroergonomics on the go. An evaluation of the potential of mobile EEG for work-place assessment and design. *Human Factors*, doi: 10.1177/00187208211007707

Yordanova, J., Gajewski, P.D., Getzmann, S., Falkenstein, M. & Kolev, V. (2021). Neural correlates of aging-related differences in pro-active control in a dual task. *Frontiers in Aging Neuroscience*, *13*, 682499.

2020

Bierbrauer, A., Kunz, L., Gomes, C.A., Luhmann, M., Deuker, L., Getzmann, S., Wascher, E., Gajewski, P.D., Hengstler, J., Fernandez-Alvarez, M., Atienza, M., Cammisuli, D.M., Bonatti, F., Pruneti, C., Percesepe, A., Bellaali, Y., Hanseeuw, B., Strange, B.A., Cantero, J.L. & Axmacher, N. (2020). Unmasking selective path integration deficits in Alzheimer's disease risk carriers. *Science Advances*, *6*, 1394.

Gajewski, P.D., Thönes, S., Falkenstein, M., Wascher, E. & Getzmann, S. (2020). Multidomain cognitive training transfers to attentional and executive functions in healthy older adults. *Frontiers Human Neuroscience*, *14*, 586963.

Getzmann, S., Klatt, L.-I., Schneider, D., Begau, A. & Wascher, E. (2020). EEG correlates of lateralized shifts of attention in a dynamic multi-talker speech perception scenario. *Hearing Research*, 108077.

Karthaus, M., Wascher, E., Falkenstein, M. & Getzmann, S. (2020). The ability of young, middle-aged and older drivers to inhibit visual and auditory distraction in a driving simulator task. *Transportation Research Part F: Psychology and Behaviour*, *68*, 272-284.

Klatt, L.-I., Getzmann, S., Begau, A. & Schneider, D. (2020). A dual mechanism underlying retroactive shifts of auditory spatial attention: dissociating target- and distractor-related modulations of alpha lateralization. *Science Reports* *10*, 13860.

Klatt, L.-I., Schneider, D., Schubert, A.-L., Hanenberg, C., Lewald, J., Wascher, E. & Getzmann, S. (2020). Unraveling the relation between EEG-correlates of attentional orienting and sound localization performance: a diffusion model approach. *Journal of Cognitive Neuroscience*, *32*, 945-962.

Wascher, E., Arnau, S., Schneider, D., Hoppe, K., Getzmann, S. & Verleger, R. (2020). No effect of target probability on P3b amplitudes. *International Journal of Psychophysiology*, *153*, 107-115.

2019

Hanenberg, C., Getzmann, S. & Lewald, J. (2019). Transcranial direct current stimulation of posterior temporal cortex modulates electrophysiological correlates of auditory selective spatial attention in posterior parietal cortex. *Neuropsychologia*, *131*, 160-170.

Kobald, S.O., Wascher, E., Heppner, H. & Getzmann, S. (2019). Eye-blinks are related to auditory information processing: Evidence from a complex speech perception task. *Psychological Research*, *83*, 1281-1291.

Wascher, E., Arnau, S., Reiser, J.E., Rudinger, G., Karthaus, M. & Getzmann, S. (2019). Evaluating mental load during realistic driving simulations by means of round the ear electrodes. *Frontiers in Neuroscience*, *13*, 940.

2018

Getzmann, S., Arnau, S., Karthaus, M., Reiser, J.E. & Wascher, E. (2018). Age-related differences in pro-active driving behaviour revealed by EEG measures. *Frontiers in Human Neuroscience*, *12*, 321.

Getzmann, S. Wascher, E. & Schneider, D. (2018). The role of inhibition for working memory processes: ERP evidence from a short-term storage task. *Psychophysiology*, *55*, e13026.

Karthaus, M., Wascher, E. & Getzmann, S. (2018). Proactive vs. reactive car driving: EEG evidence for different driving strategies of older drivers. *PLoS ONE*, *13*: e0191500.

Karthaus, M., Wascher, E. & Getzmann, S. (2018). Effects of visual and acoustic distraction on driving behavior and EEG in young and older car drivers: A driving simulation study. *Frontiers in Aging Neuroscience*, *10*, 420.

Klatt, L.-I., Getzmann, S., Wascher, E. & Schneider, D. (2018). Searching for auditory targets in external space and in working memory: electrophysiological mechanisms underlying perceptual and retroactive spatial attention. *Behavioural Brain Research*, *353*, 98-107.

Klatt, L.-I., Getzmann, S. & Schneider, D. (2018). The contribution of selective spatial attention to sound detection and sound localization: evidence from event-related potentials and lateralized alpha oscillations. *Biological Psychology*, *138*, 133-145.

Lewald, J., Schlüter, M.-C. & Getzmann, S. (2018). Cortical processing of location changes in a “cocktail-party” situation: Spatial oddball effects on electrophysiological correlates of auditory selective attention. *Hearing Research*, *365*, 49-61.

Wascher, E., Arnau, S., Gutberlet, I., Karthaus, M. & Getzmann, S. (2018). Evaluating mental states in pro-active and re-active driving scenarios. *Frontiers in Human Neuroscience*, *12*, 205.

2017

Gajewski, P.D., Boden, S., Freude, G., Martus, P., Potter, G.G., Claus, M., Bröde, P., Watzl, C., Getzmann, S. & Falkenstein, M. (2017). Executive control, ERP and pro-inflammatory activity in emotionally exhausted middle-aged employees. Comparison between subclinical burnout and mild depression. *Psychoneuroendocrinology*, *86*, 176-186.

Getzmann, S., Jasny, J. & Falkenstein M. (2017). Switching of auditory attention in “cocktail-party” listening: ERP evidence of cueing effects in younger and older adults. *Brain and Cognition*, *111*, 1-12.

Getzmann, S. & Wascher, E. (2017). Visually guided auditory attention in a dynamic “cocktail-party” speech perception task: ERP evidence for age-related differences. *Hearing Research*, *344*, 98-108.

Golob, E.J., Lewald, J., Getzmann, S. & Mock, J.R. (2017). Number magnitude biases sound localization. *Scientific Reports*, 7, 17252.

Schneider, D., Barth, A., Getzmann, S. & Wascher, E. (2017). On the neural mechanisms underlying the protective function of retroactive cuing against perceptual interference: Evidence by event-related potentials of the EEG. *Biological Psychology*, 124, 47-56.

2016

Getzmann, S., Golob, E.J. & Wascher, E. (2016). Focused and divided attention in a simulated cocktail-party situation: ERP evidence from younger and older adults. *Neurobiology of Aging*, 41, 138-149.

Getzmann, S. & Wascher, E. (2016). Post-deviance distraction in younger and older adults: Neuro-behavioural evidence from a dynamic speech perception task. *Psychology and Aging*, 31, 943-957.

Golob, E.J., Lewald, J. & Getzmann, S. (2016). Interaction of number magnitude and stimulus position in auditory localization of speech. *Perception*, 45, 165-79.

Grzeschik, R., Lewald, J., Verhey, J.L., Hoffmann, M.B. & Getzmann, S. (2016). Cross-modal motion adaptation investigated with event-related potentials to visual and auditory free-field motion. *European Journal of Neuroscience*, 43, 66-77.

Kobald, S.O., Getzmann, S., Beste, C. & Wascher, E. (2016). The impact of simulated MRI scanner background noise on visual attention processes as measured by the EEG. *Scientific Reports*, 6.

Lewald, J., Hanenberg, C. & Getzmann, S. (2016). Brain correlates of the orientation of auditory spatial attention onto speaker location in a “cocktail-party” situation. *Psychophysiology*, 53, 1484-1495.

Wascher, E., Getzmann, S. & Karthaus, M. (2016). Driver state examination – treading new paths. *Accident Analysis & Prevention*, 91, 157-165.

Wascher, E., Heppner, H., Kobald, S.O., Arnau, S., Getzmann, S. & Möckel, T. (2016). Age-sensitive effects of enduring work with alternating cognitive and physical load. A study applying mobile EEG in a real life working scenario. *Frontiers in Human Neuroscience*, 9, 711.

2015

Getzmann, S., Falkenstein, M. & Wascher, E. (2015). ERP correlates of auditory goal-directed behavior of younger and older adults in a dynamic speech perception task. *Behavioural Brain Research*, 278, 435-445.

Getzmann, S., Hanenberg, C., Lewald, J., Falkenstein, M. & Wascher, E. (2015). Effects of age on electrophysiological correlates of speech processing in a dynamic “cocktail-party” situation. *Frontiers in Neuroscience*, 9, 341.

Getzmann, S. & Näätänen, R. (2015). The mismatch negativity (MMN) as a measure of auditory stream segregation in a simulated “cocktail-party” scenario: Effect of age. *Neurobiology of Aging*, *36*, 3029-3037.

Getzmann, S., Wascher, E. & Falkenstein, M. (2015). What does successful speech-in-noise perception in aging depend on? Electrophysiological correlates of high and low performance in older adults. *Neuropsychologia*, *70*, 43-57.

Lewald, J. & Getzmann, S. (2015). Electrophysiological correlates of cocktail-party listening. *Behavioural Brain Research*, *292*, 157-166.

Selinski, S., Getzmann, S., Gajewski, P.D., Blaszkewicz, M., Hengstler, J.G., Falkenstein, M. & Golka, K. (2015). The ultra-slow NAT2*6A haplotype is associated with reduced higher cognitive functions in an elderly study group. *Archives of Toxicology*, *89*, 2291-2303.

Wascher, E., Heppner, H., Möckel, T., Kobald, S.O., & Getzmann, S. (2015). Eye-blinks in choice response tasks uncover hidden aspects of information processing. *EXCLI Journal*, *14*, 1207-1218.

2014

Beste, C., Getzmann, S., Gajewski, P.D., Golka, K. & Falkenstein, M. (2014). Latent *Toxoplasma gondii* infection leads to deficits in goal-directed behaviour in healthy elderly. *Neurobiology of Aging*, *35*, 1037-1044.

Getzmann, S., Falkenstein, M. & Gajewski, P.D. (2014). Neuro-behavioral correlates of post-deviance distraction in middle-aged and old adults. *Journal of Psychophysiology*, *28*, 178-186.

Getzmann, S. & Lewald, J. (2014). Modulation of auditory motion processing by visual motion: Early crossmodal interactions in human auditory cortices. *Journal of Psychophysiology*, *28*, 82-100.

Getzmann, S., Lewald, J. & Falkenstein, M. (2014). Using auditory pre-information to solve the cocktail-party problem: electrophysiological evidence for age-specific differences. *Frontiers in Neuroscience*, *8*, 413.

Wascher, E. & Getzmann, S. (2014). Rapid mental fatigue amplifies age-related attentional deficits. *Journal of Psychophysiology*, *28*, 215-224.

2013

Getzmann, S., Falkenstein, M. & Gajewski, P.D. (2013). Long-term cardiovascular fitness is associated with auditory attentional control in old adults: neuro-behavioral evidence. *PLoS ONE*, *8*(9), e74539.

Getzmann, S., Gajewski, P.D. & Falkenstein, M. (2013). Does age increase auditory distraction? Electrophysiological correlates of high and low performance in seniors. *Neurobiology of Aging*, *34*, 1952-1962.

Getzmann, S., Gajewski, P.D., Hengstler, J.G., Falkenstein, M. & Beste, C. (2013). BDNF Val66Met polymorphism and goal-directed behaviour in healthy elderly – evidence from auditory distraction. *NeuroImage*, *64*, 290-298.

Lewald, J. & Getzmann, S. (2013). Ventral and dorsal visual pathways support auditory motion processing in the blind: Evidence from electrical neuroimaging. *European Journal of Neuroscience*, *38*, 3201-3209.

2012

Altmann, C.F., Getzmann, S. & Lewald, J. (2012). Allocentric or craniocentric representation of acoustic space: an electrotopography study using mismatch negativity. *PLoS ONE*, *7*(7), e41872.

Getzmann, S. (2012). Handicapped due to age? Behavioural and electrophysiological correlates of speech perception of dichotically presented narratives in young and middle-aged listeners. *Journal of Psychophysiology*, *26*, 132-144.

Getzmann, S. & Lewald, J. (2012). Cortical processing of change in sound location: Smooth motion versus discontinuous displacement. *Brain Research*, *1466*, 119-127.

2011

Getzmann, S. (2011). Auditory motion perception: Onset position and motion direction are encoded in discrete processing stages. *European Journal of Neuroscience*, *33*, 1339-1350.

Getzmann, S. & Falkenstein, M. (2011). Understanding of spoken language under challenging listening conditions in younger and older listeners: A combined behavioural and electrophysiological study. *Brain Research*, *1415*, 8-22.

Getzmann, S. & Lewald, J. (2011). The effect of spatial adaptation on auditory motion processing. *Hearing Research*, *272*, 21-29.

Kreitewolf, J., Lewald, J. & Getzmann, S. (2011). Effect of attention on cortical processing of sound motion: an EEG study. *NeuroImage*, *54*, 2340-2349.

Lewald, J. & Getzmann, S. (2011). When and where of auditory spatial processing in cortex: A novel approach using electrotopography. *PLoS ONE*, *6*(9), e25146.

2010

Getzmann, S. & Lewald, J. (2010). Shared cortical systems for processing of horizontal and vertical sound motion. *Journal of Neurophysiology*, *103*, 1896-1904.

Getzmann, S. & Lewald, J. (2010). Effects of natural versus artificial spatial cues on electrophysiological correlates of auditory motion. *Hearing Research*, 259, 44-54.

2009

Getzmann, S. (2009). Effect of auditory motion velocity on reaction time and cortical processes. *Neuropsychologia*, 47, 2625-2633.

Getzmann, S. (2009). Exploring auditory saltation using the "reduced-rabbit" paradigm. *Journal of Experimental Psychology: Human Perception and Performance*, 35, 289-304.

Getzmann, S. & Lewald, J. (2009). Constancy of target velocity as a critical factor in the emergence of auditory and visual representational momentum. *Experimental Brain Research*, 193, 437-443.

Trojan, J., Getzmann, S., Möller, J., Kleinböhl, D. & Hölzl, R. (2009). Tactile-auditory saltation: Spatiotemporal integration across sensory modalities. *Neuroscience Letters*, 460, 156-160.

2008 and before

Bruns, P. & Getzmann, S. (2008). Audiovisual influences on the perception of visual apparent motion: Exploring the effect of a single sound. *Acta Psychologica*, 129, 273-283.

Getzmann, S. (2008) Effects of velocity and motion-onset delay on detection and discrimination of sound motion. *Hearing Research*, 246, 44-51.

Getzmann, S. (2008). The effect of spectral difference on auditory saltation. *Experimental Psychology*, 55, 64-71.

Getzmann, S. & Lewald, J. (2007). Localization of moving sound. *Perception & Psychophysics*, 69, 1022-1034.

Getzmann, S. (2007). Saltation in pitch perception. *Experimental Brain Research*, 179, 571-581.

Getzmann, S. (2007). The effect of brief auditory stimuli on visual apparent motion. *Perception*, 36, 1089-1103.

Lewald, J. & Getzmann, S. (2006). Horizontal and vertical effects of eye position on sound localization. *Hearing Research*, 213, 99-106.

Getzmann, S. (2005). Shifting the onset of a moving sound source: A Fröhlich Effect in spatial hearing. *Hearing Research*, 210, 104-111.

Getzmann, S. (2005). Representational momentum in spatial hearing does not depend on eye movements. *Experimental Brain Research*, 165, 229-238.

Getzmann, S. (2004). Spatial discrimination of sound sources in the median plane: The effect of a preceding noise. *Acta Acustica united with Acustica*, 90, 1185-1191.

Getzmann, S. (2004). Spatial discrimination of two sound sources in the horizontal plane following an adapter sound. *Hearing Research*, *191*, 14-20.

Getzmann, S., Lewald, J. & Guski, R. (2004). Representational momentum in spatial hearing. *Perception*, *33*, 591-599.

Schwerdtfeger, A., Getzmann, S. & Baltissen, R. (2004). Fast reducers, slow augmenters: A psychophysiological analysis of temperament-related differences in reaction time. *International Journal of Psychophysiology*, *52*, 225-237.

Getzmann, S. (2003). The influence of the acoustic context on sound source localization in the vertical plane. *Perception & Psychophysics*, *65*, 1045-1057.

Getzmann, S. (2003). Auditory localization aftereffects in the median plane: Elevation shifts induced by a preceding noise. *Acta Acustica united with Acustica*, *89*, 875-881.

Getzmann, S. (2003). A comparison of the contrast effects in sound localization in the horizontal and vertical planes. *Experimental Psychology*, *50*, 131-141.

Getzmann, S. (2002). The effect of eye position and background noise on vertical sound localization. *Hearing Research*, *169*, 130-139.