Ronald G. Weisman. Ph.D., Professor Emeritus of Psychology and Biology (14 September 1937 – 27 January 2015)

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Ronald G. Weisman made major contributions to the field of comparative cognition for over 50 years. Ron finished his career as Professor Emeritus in the Departments of Psychology and Biology at Queen's University located in Kingston, Ontario. Ron was born in Detroit, Michigan in 1937 and died in Kingston, Ontario in 2015. Ron earned a B.A. (1960), M.A. (1961), and Ph.D. (1964) from Michigan State University. Ron's first research publications came from work that employed principles of learning in an educational setting (e.g., Krumboltz & Weisman, 1962). Ultimately, Ron completed his graduate work with Jack King and M. Ray Denny studying animal behaviour with a focus on learning processes in mice (e.g., Denny & Weisman, 1964; King & Weisman, 1964).

Following his graduate work at MSU, Ron was an National Science Foundation (NSF) postdoctoral fellow with David Premack at the University of California, Santa Barbara from 1965 to 1966. Ron was hired as Assistant Professor of Psychology at Queen's University in 1964. He was promoted to Associate Professor in 1970, again to Professor in 1977, cross appointed to the Department of Biology in 1993, and finally promoted to Professor Emeritus in 2000. In sum, Ron was a professor at Queen's for over 50 years. During his time at Queen's, Ron took up many visiting appointments at other universities, including at Duke University, Florida Tech, Johns Hopkins University, Sussex University, King's College at Cambridge University, and the University of California San Diego.

Ron made numerous significant contributions to our understanding of animal learning, cognition, and behaviour. In his early career as an independent scientist, much of his work focused on investigating the determinants of behaviour, using what can be considered a traditional approach to understanding behaviour: experiments conducted in conditioning chambers, using rats and pigeons as subjects (e.g., Weisman, 1975). In these studies he made many contributions to understanding basic learning processes such as discrimination, inhibition, and avoidance learning. This work, although important and well-regarded, is not what most people will remember as Ron's main scientific contributions. The work from the "second act" of his career is the work for which Ron will be most remembered.

In the 1980s, Ron embarked on a new career, studying all aspects of songbird vocal perception and production. Being a newcomer to the empirical study of songbirds, Ron started almost from scratch. The genesis of this new career was characterized by a series of happy coincidences, a real life evolution of a research program, if you will. Around the time of his trip to San Diego, Ron had become interested in understanding how animals process information, and wanted to apply *Information Integration Theory* as a conceptual framework to do so. Up to this point, Ron had tested his ideas with pigeons as subjects, but felt that studying a natural system was a better way to proceed. It was around this same time that he met Laurene Ratcliffe, who had recently

started working at Queen's University, and asked her, as an expert in songbird behavioural ecology who had experience working with great tits (*Parus major*) at Oxford University, whether birdsong would be a good system to approach these questions. Ratcliffe suggested black-capped chickadees (*Poecile atricapillus*) as a potential model system because they had a two note song that seemed relatively simple acoustically. One of the first set of studies involved conducting operant-type procedures in the field and the laboratory that showed chickadees were sensitive to the number, note type, and order of the notes in their song (Ratcliffe & Weisman, 1986; Weisman & Ratcliffe, 1987; Ratcliffe & Weisman, 1988). Thus the simple song seemed to be not so simple upon closer experimentation. The happy coincidences continued when Stuart Hulse and Jeffery Cynx, who were already studying pitch perception in starlings (*Sturnus vulgaris*; Hulse & Cynx, 1986), performed calculations on black-capped chickadee songs that Ratcliffe and Weisman reported in their 1985 Condor paper and pointed out to Ron and Laurene that chickadees produced their two note songs with a consistent relative pitch relationship between the two notes. Once again, the "simple" song turned out to be paradoxical in its complexity embedded in seeming simplicity.

Ron forged a truly integrative research program that combined elements of learning, cognition, ethology, and neuroscience using a variety of songbird species as his study subjects (for reviews of some of this work, see Weisman & Ratcliffe, 2004 and Weisman et al., 2012). Following the early success of this work with songbird perception, Ron also began to compare the auditory perceptual abilities of songbirds with those of humans. Ron and his colleagues (notably Laurene M. Ratcliffe, T. Andrew Hurly, Daniel M. Weary, Scott MacDougall-Shackleton, Douglas J.K. Mewhort, Leslie S. Phillmore, Milan G. Njegovan, Marisa Hoeschele, Laurie L. Bloomfield, and Christopher B. Sturdy) uncovered aspects of songbird production and perception that were largely unknown before Ron embarked on this new research area. Among the most notable of his research findings, Ron and his colleagues described black-capped chickadee singing behaviour in detail and, amongst other findings, showed that chickadees produce the frequency interval in their two note *fee-bee* song with remarkable fidelity (Horn et al., 1992; Ratcliffe & Weisman, 1985; Weisman et al., 1990). Moreover, Ron showed that birds could perceive this interval with a high degree of accuracy (Weisman & Ratcliffe, 1989; Weary & Weisman, 1991). Importantly, Ron showed that this perceptual ability, as well as other auditory perceptual abilities and neurobiological correlates (Njegovan & Weisman, 1995, Phillmore et al., 2003), were impacted if the birds were reared in conditions that resulted in abnormal vocal production. Further studies, both with chickadees and zebra finches (*Taeniopygia guttata*), revealed that songbirds far outperformed humans, even trained musicians, at frequency-based discrimination tasks (e.g., Weisman et al.,1998; for a review see Weisman et al., 2012). Later work showed that zebra finches, like chickadees, had perceptual and production deficits following manipulations of the social, acoustic environment during development (Sturdy et al., 2001). A constant theme throughout his career was the encouragement and support he provided his collaborators and trainees, imploring them and others to conduct research aimed at "explaining nature" (Weisman, 2008).

Ron's career was impressive by any measure, but his impact extends beyond that accounted by metrics like number of publications, H indices, and other such measures often used for assessment. Some of the most lasting contributions that Ron made to the scientific communities to which he was utterly devoted throughout his career defy such routine enumeration. After his death in 2015, many colleagues offered descriptions of Ron's influence using phrases such as

“force of nature”, “intellectually challenging”, “passionate”, and “inspiring”. All of these things he surely was. Among Ron’s many important contributions to the scientific community was his creation of an international conference designed to bring together researchers from Psychology and Biology to share their findings and insights about behaviour, learning, and cognition across species. This conference, called the Conference on Comparative Cognition (CO3), started in 1994 with an attendance of approximately three dozen scientists and rapidly grew into a popular annual conference with a stable attendance at well over 100 presenters from all over the world. Over the years, there have been talks about numerous aspects of behaviour and cognition on over 100 species.

In response to the growth and overwhelming success of the CO3 conference, and the recognition that a more formal organizational structure was needed, Ron founded the Comparative Cognition Society (CCS) in 1997, and was the first president of CCS. This society has grown and thrived since its founding, and Ron was awarded the CCS Research Award for his substantial contributions to the field in 2007. Ron also initiated, and was the first editor and publisher of the online and open access journal, Comparative Cognition & Behavior Reviews, which has published important reviews and critical commentaries on a wide range of topics in Comparative Cognition since 2006.

Cross references

auditory signals

B.F. Skinner

Charles Darwin

Communication

Comparative cognition

Comparative psychology

Countersinging

Discrimination learning

Natural categories

Passerine cognition

Passerine communication

Passerine sensory systems

Perception

References

1. Denny, M.R. & Weisman, R.G. (1964). Avoidance behavior as a function of length of nonshock confinement. Journal of Comparative and Physiological Psychology, 58, 252-257.
2. King, J.A. & Weisman, R.G. (1964). Sand digging contingent upon bar pressing in deer mice. Animal Behavior, 12, 446-450.
3. Horn, A.G., Leonard, M., Ratcliffe, L.M., Weisman, R.G., & Shackleton, S. (1992). Frequency variation in the songs of black- capped chickadees. Auk, 109, 847-852.
4. Hulse, S.H., & Cynx, J. (1986). Interval and contour in serial pitch perception by a passerine bird, the European starling (*Sturnus vulgaris*). Journal of Comparative Psychology, 3, 215-228.
5. Krumboltz, J.D. & Weisman, R.G. (1962). The effect of overt versus covert responding to programmed instruction of immediate and delayed retention. Journal of Educational Research, 53, 89-92.
6. Njegovan, M. & Weisman, R. (1997). Pitch discrimination in field and isolation reared black-capped chickadees (*Parus atricapillus*). Journal of Comparative Psychology, 111, 294-301.
7. Phillmore, L.S., Bloomfield, L.L., & Weisman, R.G. (2003). Effects of songs and calls on ZENK expression in the auditory telencephalon of field- and isolate-reared black-capped chickadees. Behavioural Brain Research, 147, 125-134
8. Ratcliffe, L. & Weisman, R.G. (1985). Frequency shift in the fee bee song of the black-capped chickadee. The Condor, 87, 555-557.
9. Ratcliffe, L. & Weisman, R. G. (1986). Song sequence discrimination in the black-capped chickadee (*Parus atricapillus*). Journal of Comparative Psychology, 100, 361-367.
10. Ratcliffe, L. & Weisman, R. (1988) Representation of conspecific song by chickadees: Comparisons among embedded 'fee bees'. Behavioural Processes, 17, 199-203.
11. Sturdy, C.B., Phillmore, L.S., Sartor, J. J. & Weisman, R.G. (2001). Reduced social contact causes auditory perceptual deficits in zebra finches, *Taeniopygia guttata.* Animal Behaviour, 62, 1207-1218.
12. Weary, D.M. & Weisman, R.G. (1991). Operant discrimination of frequency and frequency ratio in the black-capped chickadee (*Parus atricapillus*). Journal of Comparative Psychology, 105, 253-259.
13. Weisman, R.G. (1975). Stimulus control by response-dependent shock in discriminated punishment. Bulletin of the Psychonomic Society, 5, 427-428.
14. Weisman, R.G., Mewhort, D.J.K., Hoeschele, M., & Sturdy, C.B. (2012). New perspectives on absolute pitch in birds and mammals. In E.A. Wasserman & T.R. Zentall (Eds), Handbook of Comparative Cognition. Oxford University Press, 67-79.
15. Weisman, R., Njegovan, M., Sturdy, C., Phillmore, L., Coyle, J., & Mewhort, D. (1998). Frequency range discriminations: special and general abilities in zebra finches (*Taeniopygia guttata*) and humans (*Homo sapiens*). Journal of Comparative Psychology, 112, 244-258.
16. Weisman, R. & Ratcliffe, L. (1987). How birds identify species information in song: a pattern recognition approach. Learning and Motivation, 18, 80-98.
17. Weisman, R.G. & Ratcliffe, L. (1989). Absolute and relative pitch processing in Black-capped Chickadees, *Parus atricapillus*. Animal Behaviour, 38, 685-692.

18. Weisman, R.G., & Ratcliffe, L.M. (2004). Relative pitch and the song of black-capped chickadees. American Scientist, 92, 534-539.
19. Weisman, R., Ratcliffe, L., Johnsrude, I., & Hurly, T. A. (1990). Absolute and relative pitch production in the song of the Black-Capped Chickadee (*Parus atricapillus*). Condor, 92, 118-124.
20. Weisman, R.G., (2008). Advice to young behavioral and cognitive scientists. Behavioural Processes, 77, 142-148.