BIOGRAPHICAL MEMOIRS

A. Kimball Romney

August 15, 1925–December 29, 2023
Elected to NAS, 1995

A Biographical Memoir by Susan C. Weller

A. Kimball Romney is best known for his research in cognitive anthropology and the theory of shared cultural knowledge described by the Cultural Consensus Model. He made a significant impact on the field of anthropology, training and influencing dozens of scholars in cognitive anthropology. A. Kimball Romney was my Ph.D. advisor at the University of California Irvine in the late 1970s. He was unpretentious, with a quick wit, and found time to chat or have a beer with most anyone, but he was truly passionate about science and the quest for truth. He once told me, while cleaning out his office files, that he wanted to be remembered for his published work. And so, this memorial focuses on his most highly cited contributions to science. He had several national honors, including Fellow of the American Academy of Arts and Sciences (1994) and member the National Academy of Sciences (1995).

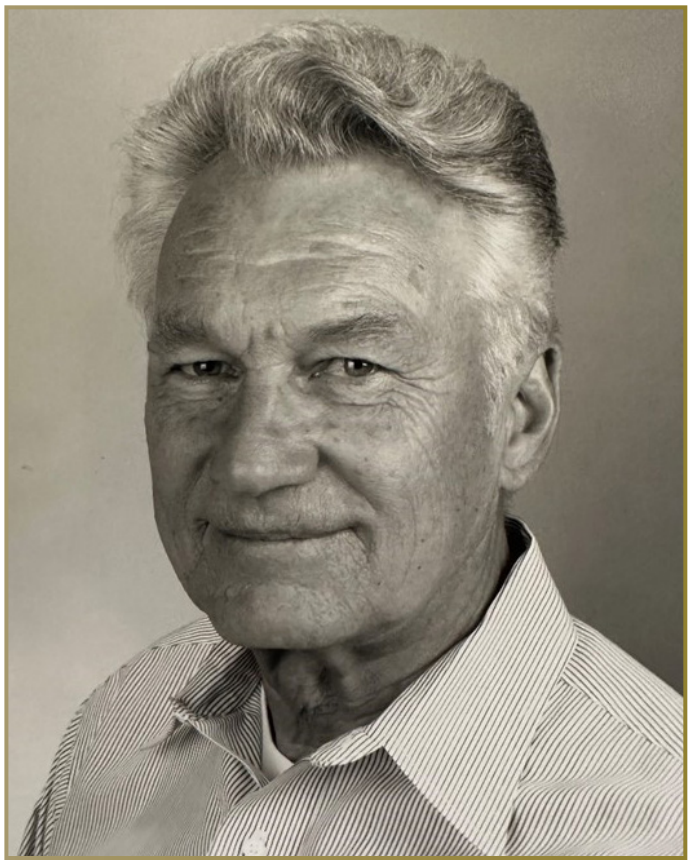

Figure 1 A. Kimball "Kim" Romney.

Early Life, Education, and Family

Antone Kimball "Kim" Romney was born into a family that emphasized education and hard work. He was born in Rexburg, Idaho, on August 15, 1925, to Antone Kimball Romney (Antone) and Gretta Maughan Romney (née Parkinson). Antone was born in 1902 in Chihuahua, Mexico, but his family resettled in Idaho at the start of the Mexican Revolution in 1917. Antone and Gretta married while both were teachers in Rexburg, but they moved to Provo, Utah, so that Antone could further his education. Antone taught at Provo High School during the Great Depression, and Kim remembered his father being paid in paper scrip. In Provo, Kim helped his father build their family home. For several years, the family took in boarders and extended family. Antone received his bachelor's and master's degrees from Brigham Young University (BYU) and in 1947 earned a doctorate in education from Stanford University. He joined the BYU faculty as a professor in the College of Education and later served as dean. Gretta also earned bachelor's and master's degrees from BYU and worked in the Provo City School District. Not surprisingly, all three of their children, Kim, Barbara, and Gretta Anne, became educators. Both parents were active in the Church of Latter-Day Saints (LDS)

leadership, with outstanding service in church administration and the Relief Society.

Kim met his wife, Afton Romaine Barber Romney (Romaine), at the University of Colorado, Boulder, during World War II, while he was a Navy cadet and she was a nursing student. They married in 1945 and were married seventy-seven years before her passing at ninety-seven years old on December 27, 2022, almost exactly one year before Kim's passing at ninety-eight years old on December 29, 2023. They enjoyed travel and went on seventy-five cruises and tours with family and friends, and Kim went on four more cruises in the year before his passing! They had five children: Rebecca Anne, Robert Kimball, Xochitl Patricia, Katherine, and Lisa Gretta. The early years of their marriage were spent moving around as Kim pursued his education and research. Kim received his bachelor's degree in sociology in 1947 from BYU and remained there for his master's degree, which he completed in 1948. He also taught at BYU during his graduate studies. He then taught at Purdue University (1948–49) and the University of Wisconsin (1949–50), before enrolling at Harvard University in 1951 to pursue a Ph.D. Kim and Romaine did fieldwork in Juxtlahuaca, Mexico, while Becky and Bob were still toddlers. The family lived in an adobe house without electricity or running water, and their third child, Xochitl Patricia, was born there. Their joint fieldwork was published as *The Mixtecans of Juxtlahuaca, Mexico.*[1] Romaine continued to support and participate in Kim's fieldwork with the Navaho in New Mexico and the Maya in Chiapas, Mexico, and in Guatemala. Romaine also was active in the LDS Church with lifelong service, including the Relief Society. Kim is survived by four of his children (Becky predeceased her parents), six grandchildren, and eleven great-grandchildren.

Career

Kim completed his Ph.D. in social anthropology in 1956 in Harvard's Department of Social Relations, a uniquely integrated department that combined sociology, psychology, and anthropology. Faculty included Florence and Clyde Kluckhohn, John W. and Beatrice Whiting, Evon Vogt, Jerome Bruner, and Roger Brown. The Romneys' fieldwork in Juxtlahuaca, Mexico, was part of the Whitings' Six Cultures Study of Socialization, which compared child-rearing practices in communities in New England, the Philippines, Okinawa, Mexico, India, and Kenya.[2,3] Kim was hired as an assistant professor at the University of Chicago in 1955 and then was awarded a one-year fellowship at the Center for Advanced Study in the Behavioral Sciences, Stanford University, for the following academic year. He joined the faculty at Stanford University as an assistant professor in 1957 and by 1960 was the director of anthropological research in the department.

It was at Stanford that Kim began to make an indelible mark on anthropology, training and influencing many anthropologists. Roy D'Andrade did fieldwork in Chiapas with Kim before completing his Ph.D. at Harvard in 1962 and then joined the Stanford faculty. Together, and with others, Romney and D'Andrade forged a new direction in anthropology aimed at understanding how people organize and use cultural knowledge. A 1963 conference on the Yucatan resulted in a transformative volume, *Transcultural Studies in Cognition*, which integrated anthropology, linguistics, and psychology and created the field of cognitive anthropology.[4,5,6]

Kim moved to Harvard as a full professor in 1966 and taught there for two years before being recruited as the dean of the new School of Social Sciences at the University of California, Irvine in 1969. He shaped the school in meaningful ways, re-creating Harvard's interdisciplinary Ph.D. program in social relations. He also contributed funding (earmarked for a social sciences computing center) to the Information and Computer Science Department, a prescient decision that ensured that social science would have ready access to current computing technologies and software for decades to come.[i] And, social science undergraduates were required to take a computer science course. Kim found his intellectual home among colleagues and friends at Irvine. He retired in 1995, the year of his election to the National Academy of Sciences, and continued as a productive researcher there for the next two decades.

Intellectual Contributions

Kim published on a wide variety of topics, but with a common thread linking methods and ideas. His biggest impact was in systematic data collection methods and analyses that were the foundation—and legacy—of cognitive anthropology. He had a long-standing interest in shared cognitive representations and intracultural variation, from his early work on kinship terminology to multidimensional scaling and the representation of semantic domain structures. Kinship offers a purely cultural system for study, as kinship systems around the world are based on the same underlying biological relationships but differ in how those relationships are perceived and named/labeled and how terminology relates to behaviors, responsibilities, and social structures. For example, several societies call a mother's sister "mother." Romney's work on kinship systems focused on creating notational systems, models, and typologies from a distillation of dimensions for discrimination between terms and identification of associated proscriptions for behaviors, such as marriage.[7,8,9] One study compared all possible sibling term models that could exist to those that do exist.[10] For example, in American English we distinguish between brother and sister (a sex-only distinction), but the modal cross-cultural model uses both sex and

age to distinguish older brother, younger brother, older sister, and younger sister. The study found that sibling terminology was associated with other cultural features, such as duration of post-partum sex taboos.

Romney and D'Andrade proposed a three-dimensional model of male American kinship terms[11] that contrasted with a two-dimensional model proposed by Anthony F. C. Wallace and John Atkins.[12] Romney and D'Andrade collected data to test the "psychological reality" of the two models. They introduced free-listing as a way to collect salient terms in a cultural domain and triadic similarity judgments as a way to estimate the cognitive structure for terms in a domain. The underlying process model assumed that individual cognitive kinship models guide similarity choices, and results showed a better fit between the similarity data and the Romney-D'Andrade model.

As new statistical methods were developed, the comparison of these two models and, specifically, the determination of whether there was a single, modal model or possibly multiple cognitive models was revisited.[13,14] The Romney-D'Andrade model better fit the empirical data than the Wallace-Atkins model and accounted for significantly more of the empirical data.[15] These studies demonstrated that the American kinship system is a highly shared cultural model with individual variation around a single modal model that is learned and incorporated within the first decade of life.[16] Romney later returned to this problem,[17] comparing monolingual and bilingual English speakers, and found the definitional structure of semantic domains "is routinely learned with the language," regardless of when English is learned.[ii]

The development of non-metric multidimensional scaling (MDS) in the 1960s facilitated the study of cognitive models for kinship and other domains.[18,19] MDS and related clustering techniques allowed for the detailed study of the structure of semantic domains and represented the meaning of lexical items in relation to other items in the same domain. Non-metric MDS made fewer assumptions about data, relaxing linear assumptions of factor analysis and principal components and resulting in fewer, more interpretable dimensions with a goodness-of-fit index (between data and the representation), making it appropriate for a wide variety of social science applications.[20]

Kim was also interested in whether such representations were cognitively valid. Does a model created from a listing of domain terms and spatially represented judged similarity between the terms have any relationship to what is in someone's mind? MDS could accurately retrieve and represent known spatial configurations, such as maps,[21,22] but could the model predict results involving memory storage and retrieval tasks? Evidence for an isomorphic link between a spatial model based on similarity data and a mental model[23] became clear when distances within spatial models predicted analogical reasoning tasks,[24] reaction time judgments,[25,26] and clustering in free-recall lists.[27] Additionally, the few salient features or dimensions used to discriminate between domain items appeared congruent with human information processing limits.[iii]

However, memory storage and retrieval processes can systematically distort recall.[28,29] H. Russell Bernard and coauthors showed that half of the data informants recalled about their interactions with others was wrong and proposed that informants simply are not good sources of information on this behavior.[30] Romney and colleagues responded by finding regularities in reporting "errors," with biases occurring in predictable ways.[iv] Recall of a singular event corresponded less with the actual event than with the longer-range pattern or typical event, which is usually the interest of social scientists.[31,32] Similarly, reported interactions captured the social structure and corresponded to observed interactions when confounding magnitude effects (high/low interactors) were removed from the observed data.[33] Also, people tended to inflate their own position and importance[34] and positive traits.[35,36]

The Cultural Consensus Model

Ideas about shared cultural beliefs coalesced into a formal model, the Cultural Consensus Model. Kim's ideas about shared culture were influenced by those of Alfred Kroeber and John Roberts regarding systemic culture patterns, shared cultural elements, and distributed cultural knowledge.[37,38] Also, conversations with Roy D'Andrade[39] likely helped to crystallize the idea that shared cultural knowledge results in agreement between people when reporting on culture and cultural domains.

Kim devoured psychometric theory[40] and applied a reliability analysis to the Bernard et al.[41] recall data to successfully predict reporting accuracy from respondents' reliability.[42] The key idea was that agreement and reliability are a function of shared knowledge. This mirrors Charles Spearman's findings in psychology in 1910,[v] in which he observed that agreement in the answers of two respondents is a function of their agreement with the true answers and then formalized the relationship between agreement between variables and the reliability and validity of an aggregation.[43–46]

Hearing these results, William Batchelder, a mathematical psychologist, linked the aggregation of responses to the Marquis de Condorcet's 1785 "jury problem"[vi] and formalized the initial cultural consensus models.[47,48,49] The 1986 Romney, Weller, and Batchelder paper in the *American Anthropologist* introducing the Cultural Consensus Model was a big step forward for culture theory and the formal assessment of shared cultural beliefs.[50] It is among the journal's most highly cited articles—in and outside of anthropology.[vii]

The Cultural Consensus Model offered a way to measure and identify shared knowledge, values, and norms. Beginning with articulated assumptions—culture is learned and shared knowledge, and agreement between respondents is a function of their shared, cultural knowledge—the model offered a way to estimate cultural beliefs from the pattern of agreement among respondents. In other words, given responses to a set of culturally related questions, we could measure agreement between respondents and estimate the culturally "correct" answers, when the answers were unknown,[viii] and estimate how well each respondent's answers corresponded to the culturally "correct" answers.

Historically and intuitively, we have described responses to questions with the modal response, but interpretation can be difficult without a strong majority.[51] Perhaps there was no culturally preferred answer or maybe subgroups of people had different preferred answers? The power of the cultural consensus model is that it estimates answers by "weighting" each person's responses with their agreement with the group before combining responses, maximizing information and facilitating the accurate estimation of answers, even with small sample sizes. Results also can help to determine whether respondents form a single group or whether there are subgroups.[ix]

Transparency and Methodology

Throughout Kim's work was concern for the improvement of data collection methods and analysis. Kim was emphatic about using systematic, transparent, replicable methods. The key to moving science ahead is replication and the key to replication is transparency. Who was studied? What was asked? How were data analyzed? A National Science Foundation conference on data quality in cultural anthropology made specific recommendations about how to improve primary data collection methods.[52] The subsequent monograph, *Systematic Data Collection,*[53] became a highly cited field handbook. Kim's interest in analysis focused on scaling and the visual representation of data, resulting in two volumes on MDS,[54,55] a monograph entitled *Metric Scaling: Correspondence Analysis,*[56] and articles linking MDS and correspondence analysis.[57,58,59]

An interesting thread in Kim's work concerns the iterative "smoothing" technique that he often used. While a graduate student at Harvard, Kim was a research assistant for the statistician Fredrick Mosteller. Mosteller was developing iterative "smoothing" for tables of frequency data to better understand association patterns within tables, separate from differences in marginal totals. Kim used smoothing to study marriage patterns[60,61,62] between subgroups to separate marriage preference choice from subgroup size.[x] Mosteller's 1968 presidential address to the American Statistical Society highlighted Kim's model for marriage preference.[63] The iterative proportional smoothing technique became the algorithmic guts of log-linear models.[64] These two threads, iterative smoothing and spatial modeling, laid the groundwork for understanding the norming and representation of data with correspondence analysis. And interestingly, the 1990 monograph on correspondence analysis began with a ransacking of color receptor data, which became Kim's research passion during the last few decades of his life.[65]

Retirement and Later Work

Kim did some of his best work after retirement. Returning to cross-cultural data, Romney and colleagues redefined culture areas from the six customary continental regions to nine regions based on similarity in social structures and practices.[66] He also identified historical relationships between language, geographical propinquity, and cultural artifacts.[67,68] He had explored a variety of cultural domains,[xi] but it was his work on kinship, animals, emotions, and colors that had the most theoretical importance with the discovery of shared unimodal models *and* a strategy for partitioning of intra- and intercultural variation. He established the protocol with the kinship study,[69] using free-listing to establish a culturally salient set of domain terms and collecting judged-similarity data,[70] but the switch to correspondence analysis to represent the similarity data was a key element, as it provided an estimate of the group structure, individual "mental" structures, and quantitative detail on sources of variation.[71,72,73] The shared structure of emotion terms (across Japanese, Mandarin Chinese, and American English)[74,75] suggested cross-cultural universality, as the majority of shared meaning was across cultural-linguistic groups with a much smaller fraction of shared meaning unique to each language. Similarly, the shared structure for colors *and* color terms (for American English and Mandarin Chinese)[76,77] provided evidence for the shared meaning of colors across cultural-linguistic groups, as predicted by Brent Berlin, Paul Kay, and colleagues,[78–82] with only a tiny fraction of variation unique to language groups.[xii]

After finding a shared structure in colors and color terms, Kim turned to psychophysical measurement of colors with vision and color scientist Tarow Indow,[83] measuring the reflectance spectra in the Munsell color chart, and found that colors could be arranged into three interpretable dimensions that correspond to human perception.[84,85,86] With D'Andrade, he defined the mathematical transformations between colors and receptor cells[87] and used the Munsell color chips to study signals to optic pathways in the brain.[88,89] The linking of specific colors to a mathematical formula resulted in a U.S. patent.[90,91,92]

Legacy

Kim's impact on the field can be seen in his many collaborative ties and his many students. He was a charismatic

Figure 2 Kim Romney at the tiller (taken by his son on their way down the coast of Mexico).

teacher, always patient, and never critical. Brent Berlin says, "I admired him as a fine teacher (but never mastered his smooth don't-read-your-lecture-notes teaching presentation), who never made me feel ignorant or unworthy (maybe because of his own background)." In 2002, students and colleagues gathered to honor Kim, resulting in a two-volume festschrift, one for contributions to anthropology and another for social networks.[93,94] Kim's learning style of hammering away at something until he mastered it served him well and was something he passed on to students. It was also how he learned to sail. When he considered fieldwork among the Cuna in the San Blas Islands in Panama, he planned to sail down and through the Panama Canal and practiced by taking his thirty-three-foot sloop *Canicula* out when the small craft warning flags went up—warning that small craft should *not* go out. He sailed down and through the canal with his son, Bob, in 1974 and then down the coast of Mexico in *Sundance* in 1981 and again in 1988.

Kim's work and his intellectual legacy span anthropology, cognitive science, and social science methodology. He discovered the American model of kinship that we learn when learning English. With improvements in data collection and analysis methods, he confirmed and refined ideas of distributed cultural knowledge around single, shared cultural models. Romney's focus on shared cultural knowledge resulted in the development of cultural consensus theory, facilitating the systematic definition of cultural beliefs and the interpretation of intracultural variation.[95,96,97]

Acknowledgments

I would like to thank the following people for discussion and comments on an earlier draft: Brent Berlin, H. Russell Bernard, Stephen Borgatti, Devon Brewer, Xochitl Patricia Conner, William Dressler, Katherine Faust, Joao Ferreira-Pinto, Jeffrey Johnson, Karen Leonard, and Sara Nerlove. A. Kimball Romney was my Ph.D. advisor in the late 1970s.

Notes

i This made Irvine fairly unique in its access to Bell Labs software programs for multidimensional scaling, hierarchical clustering, and individual differences scaling (INDSCAL), software that was essential for Romney's research.

ii Michael Burton and Sara Nerlove, students of Romney, streamlined triadic comparisons and thus facilitated the collection of similarity data for all American kinterms, including females, allowing for representation of a four-dimensional model (the fourth dimension was sex).[98]

iii Miller estimated humans could use combinations of only a handful of distinguishing features because of information processing limits.[99] Similarly, Wallace[100] observed that regardless of the number of kinterms or the size and complexity of a society, kinship systems appeared to be based on six or fewer distinguishing features, and Berlin, Breedlove, and Raven[101] found that folk taxonomies typically had only five or fewer distinguishing features.

iv The International Network for Social Network Analysis awarded Kim the Simmel Award (1993) for his contributions to social network analysis.

v Spearman formalized the relationship between agreement among variables and the reliability and validity of the aggregation. This is known as the Spearman-Brown prophesy formula and can be applied to aggregations of people as well as variables.[102,103,104]

vi Approximately two centuries ago, Condorcet published a theorem on the accuracy of a jury verdict—the aggregation of binary choices—as a function of the competence of individual jurors. Accuracy of the aggregate is greater than that of the individuals, and the more accurate decision is reached with increasing group sizes.[105]

vii The diffusion of the Cultural Consensus Model was undoubtedly facilitated by its accessibility with Stephen Borgatti's software packages, ANTHROPAC and UCINET.[106,107]

viii In fact, the Cultural Consensus Model can be used to grade/evaluate a test without an answer key.[108,109,110]

ix Several extensions to the consensus models have been made, largely by Batchelder's students, for a fully Bayesian model[111] and multiple answer sets.[112,113]

x It was with this smoothing method that Romney and Faust removed the magnitude effects of high/low activity interactors from the social structure in observed interactions and isolated the social structure before comparing the social network structure in recalled and observed data.[114]

xi Topics that were studied were diverse and included occupations and roles,[115,116,117] concepts of success and failure,[118,119] diseases,[120] and detection of cognitive impairment.[121]

xii Although the similarity data resulted in a configuration concordant with the classic color wheel,[122] the actual psychophysical color space is somewhat irregular.[123,124]

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