SCHIELD'S ACHIEVEMENTS AS OF 12/2021

See 2015 achievements: www.statlit.org/pdf/2015-USCOTS-Schield-Lifetime-Nomination-Packet.pdf
The following is updated as of 12/2021.

1) Milo has a 'lifetime' of experience in teaching introductory statistics. He has taught statistics for more than 35 years. During that time he has written over 80 papers on a wide variety of topics. He has given hundreds of talks. Of these, 40 were given in 19 foreign countries on six continents.

2) He has made a significant contribution to statistics education with broad impact in developing and maintaining a website dedicated exclusively to statistical literacy: www.StatLit.org.

In 2003, Milo created this website. Each year since then it has been Google-ranked as #1 website dedicated to statistical literacy. Since inception, it has had more than 1.7 million downloads, 1.4 million visits and 930,000 page views. In 2014, there were more than 365,000 downloads, 260,000 visits and 170,000 page views. It is still growing. In 2014, downloads were up 36%; visits up 26% and page views up 10%.

Today, the StatLit.org website hosts over a thousand papers and slides involving statistical literacy. This website is interdisciplinary: it includes links to journalism, adult literacy, quantitative literacy and numeracy. It features pages on leading authors – both popular (e.g., Joel Best, Howard Wainer, Jane Miller and Uri Braun) and academic (e.g., Judea Pearl, Kaiser Fung, Jeffrey Bennett and Herbert Weisberg). This website is referenced in the Wikipedia article on Statistical Literacy.

Many – if not most – of those using the site have no idea that Milo owns, manages and edits this website with no assistants while teaching a full load. We know of no one in statistics education who maintains anything like Milo's website. It is a tremendous resource for statistics educators all over the world.

3) Milo has brought a unique approach to statistics education. In Milo's first paper at JSM in 1994, he said, "We must reinvent statistics." In his 1998 paper he said, the current approach "to introductory applied statistics is inadequate to provide students with ongoing statistical literacy. Emphasizing data is necessary–but not sufficient–to teach statistical literacy." "Most introductory texts and courses cover only half the topics needed for statistical literacy." "To achieve statistical literacy for all, introductory statistics must be expanded to include … the use of statistics as evidence in arguments…" Since his first JSM paper in 1994, Milo has maintained an unrelenting focus on the role of statistics as evidence in arguments. He has strongly emphasized the literacy component of statistical literacy. He focused on the use of ordinary English to distinguish association from causation by identifying those words that implied causation without asserting causation. He emphasized the importance of confounding long before the 2016 update to GAISE. He introduced standardizing as a simple way of taking into account the influence of confounders: arithmetic and graphical techniques that don't require a computer. He focused on how statistics are assembled: how they are defined, counted, measured, compared, modeled and presented by people who have interests and values. He has emphasized conditional probability by focusing on the use of ordinary English to describe and compare rates and percentages. In reviewing his 80+ papers, the variety of topics is impressive. Milo's papers are always assertive; he almost never revisits the same topic twice.

4) Milo has created a new confounder-based textbook and course. Both have been adopted by the Math-Stat department at the University of New Mexico. Working as a consultant, Milo helped gain university approval for this course to satisfy a math-stat requirement in the UNM core curriculum. He also helped gain approval from the New Mexico Higher Education Department for this course to satisfy a math-stat requirement in the state General Education curriculum. Four sections were offered in fall 2021.

Milo's confounder-based textbook and course are different. He claims there is less than a 30% overlap between his textbook and any of the traditional introductory textbooks. Three of the eight chapters are on conditional probability – taught using ordinary English to describe and compare rates and percentages as

presented in statements, tables and graphs. By creating a confounder-based statistical literacy course, Milo may be introducing the most radical change in the introductory course that our discipline has ever experienced. New topics include quasi-experiments, percentage and cases attributable, and showing how controlling for a confounder can change statistical significance into insignificance – and vice versa.

5) He has been very active in supporting statistical education organizationally. He has been a member of the ASA Section on Statistical Education since 1995. In 2011, he was elected to membership in the International Statistical Institute (ISI). http://isi.cbs.nl/ISImembers/isimembersS-Z.pdf. That same year he was elected President of the Twin Cities Chapter of the ASA.

Milo has organized 17 topic-contributed sessions on statistical literacy at the ASA-JSM (this seems like some kind of record), one late-breaking session and a session at the ISI. He has invited over 50 speakers: many from outside statistics (e.g., Joel Best, Sociology; Joe Abramson, Epidemiology; and Gary Klass, Political Science), some from statistics but outside statistics education (e.g., Donald Rubin, David Cox and John Bailar) and some from within statistics education (e.g., Jessica Utts, Deborah Rumsey, Andrew Gelman and Robert Hayden). www.statlit.org/pdf/Schield-JSM-Sessions-Statistical-Literacy.pdf

6) Milo has been active in promoting statistics and statistical literacy outside the discipline. In 1999 his invited paper, "Statistical Literacy: Thinking Critically about Statistics" appeared in the first issue of the journal *Of Significance* published by APDU: www.StatLit.org/pdf/1999SchieldAPDU.pdf

In 2001, Milo was the Principal Investigator on a four-year grant from the W. M. Keck Foundation along with Donald Rubin (Harvard) and Judea Pearl (UCLA). The purpose of the grant was "to develop statistical literacy as an interdisciplinary curriculum". This appears to be the first grant to support statistical literacy in the world. www.StatLit.org/images/2001-Augsburg-Now-Keck-Grant.jpg

In 2004, his invited paper, "Statistical Literacy and Liberal Education at Augsburg College", appeared in the AAC&U's *Peer Review*: www.StatLit.org/pdf/2004SchieldAACU.pdf. Sociologist Joel Best referred to Milo as "the leader of the statistical literacy movement" in his book, *More Damned Lies and Statistics*.

In 2005, his invited paper, "Information Literacy, Statistical Literacy and Data Literacy", appeared in the IASSIST journal, *Information Quarterly* (IQ). www.StatLit.org/pdf/2005SchieldIASSIST.pdf

In 2008, the MAA published Milo's invited paper, "Quantitative Literacy and School Mathematics", in a book titled *Calculation vs. Context*. He argued that statistical literacy should be offered in place of Algebra II for college-bound students in non-quantitative majors. www.statlit.org/pdf/2008SchieldMAA.pdf.

In 2011, he created a new catalog course at Augsburg: "Statistical Literacy for Managers". His invited paper, "Statistical Literacy: A New Mission for Data Producers", was published in the *Statistical Journal of the International Association of Official Statistics* (SJIAOS). This paper has been downloaded more than 10,000 times. www.statlit.org/pdf/2011schieldsjiaos.pdf.

7) Milo has been active in advancing statistics literacy within the discipline. Starting with his first presentation at an ASA JSM conference in 1994, Milo has written 80 papers on statistical literacy. See www.StatLit.org/pdf/Schield-Papers.pdf. Of his 11 invited or peer-reviewed papers, six are described above and five are described below. The rest were presented at the ASA JSM (27), ICOTS (5), IASE (4), MAA-JMM (4), Making Statistics More Effective in Schools of Business (3), ISI (2), etc. Milo has given more statistics talks outside the US (34 talks in 17 countries on six continents) than many educators give within the US: www.StatLit.org/pdf/Schield-Talks-by Location.pdf.

In 1998, Milo was a pioneer in his use of "statistical literacy": www.statlit.org/pdf/1998SchieldASA.pdf

His 1999 JSM paper, "Simpson's Paradox and Cornfield's conditions", was cited as a "great paper" by Peter Westfall, a former Editor of *The American Statistician*. www.StatLit.org/pdf/1999SchieldASA.pdf

In 2004, his invited paper, "Statistical Literacy Curriculum Design", appeared in the IASE *Curricular Development in Statistics Education*: www.stat.auckland.ac.nz/~iase/publications/rt04/2.4_Schield.pdf

In 2005, Milo published the first edition of his textbook, *Statistical Literacy – seeing the story behind the statistics*, for students in non-quantitative majors. This is the first introductory textbook that includes Cornfield's necessary conditions for a confounder to be able to reverse an observed association.

In 2006, *STATS* magazine published Milo's article: "Presenting Confounding Graphically Using Standardization". It has been downloaded more than 19,000 times. Peter Holmes, co-founder of ICOTS and *Teaching Statistics*, said that reading this article was the first time he "really understood Simpson's paradox." Milo's students use this technique to work problems determining if controlling for a confounder transforms a statistically-significant association into one that is statistically-insignificant – or vice versa?

In 2010, his invited paper, "Assessing Statistical Literacy: Take CARE", was published by Wiley in *Assessment Methods in Statistical Education*: www.statlit.org/pdf/2010SchieldExcerptsAssessingStatisticalLiteracy.pdf. That year he offered his statistical literacy course online.

In 2016, his invited paper, Stat 102: Social Statistics for Decision Makers, was presented at the IASE Invited Roundtable in Berlin. In 2017, his invited paper, "GAISE 2016 Promotes Statistical Literacy", was published in SERJ. In 2018, his invited ICOTS paper, " Confounding and Cornfield: Back to the Future" presented a rule for evaluating the resilience of a two-group association to unknown confounders.

In 2020, he presented "Scanlan's Paradox" and identified the necessary conditions for this paradox.

Milo continues to be very active. In 2021, he gave five presentations:

- USCOTS Workshop: Teaching Confounding. www.statlit.org/pdf/2021-Schield-USCOTS.pdf
- ISI WSC: Statistical Literacy for Policy Makers. www.statlit.org/pdf/2021-Schield-ISI.pdf
- MAA Mathfest: The Diabolical Denominator. www.statlit.org/pdf/2021-Schield-MathFest.pdf
- JSM: Statistical Literacy approved for General Education at the University of New Mexico. www.statlit.org/pdf/2021-Schield-ASA.pdf
- JSM Birds of a Feather. Statistical Literacy: Simpson's Paradox & Covid Deaths. Copy at www.statlit.org/pdf/2021-Schield-Simpsons-Paradox-Covid-UK.pdf

In August 2021, he retired from Augsburg University after 36 years of service in order to coordinate and teach statistical literacy at the Univ. of New Mexico. The students taking Math 1300 gave this new course high marks. 96% said the course helped them interpret the statistics in the everyday media (45% said it was "highly valuable"). 32% of these students (all of whom are in non-quantitative majors) agreed that "this course should be required of all college students for graduation." See www.statlit.org/pdf/2021-Fall-MATH1300-Evaluations-S2A.pdf

8) Milo has been recognized by his peers.

He is a US Director of the International Statistical Literacy Project (ISLP). In 2018, he was selected as a Fellow by the American Statistical Association. www.statlit.org/pdf/2018-Schield-ASA-Fellow.pdf. In 2019, he was elected President of the National Numeracy Network (NNN).

As of 12/2021, Milo's statistical literacy papers had received 1,098 citations per Google Scholar. www.statlit.org/pdf/2021-Schield-Papers-Citations.pdf His paper, Information Literacy, Statistical Literacy and Data Literacy, has received 246 citations. His early papers on theoretical space physics have received 511 citations (six in 2021). His efforts at the University of New Mexico were honored with an article in the 12/2021 issue of the ISLP Newsletter: www.StatLit.org/pdf/2021-Schield-ISLP.pdf