From the Editor's Desk

JSS Technical Editor
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Significance of Significance

I was recently discussing some research papers with a colleague who placed a lot of weight on the "significance" aspects of some statistical conclusions. I was reminded of one of my statistics professors from 40 years ago warning us about p values. A p value of less than 0.05 is often considered to be the "gold standard" for ascertaining whether an experimental result has merit (Ref 1). However, the result may have statistical significance but may represent a very small difference between the control and treatment groups and be of little or no practical importance. Some authors may be "bending" research data in the search for statistical significance in places where none exists. This may be the basis for the phenomena of "difficult to replicate" experiments that is now being seen by the scientific community (e.g., Ref 2). Alleged positive effects of treatments may be extremely small or non-existent making it difficult or impossible for another researcher to replicate the experiment.

The first technical paper in this issue is "Incremental Assurance Through Eliminative Argumentation" by Simon Diemert, John B. Goodenough, Jeff Joyce and Charles B. Weinstock. This paper proposes the notion of incremental assurance wherein the assurance case structure includes both the currently available evidence and a plan for incrementally increasing confidence in the system as additional or higher quality evidence becomes available.

The second technical paper is "The Difficulties with Replacing Crew Launch Abort Systems with Designed Reliability" by Shaun R. Ryan. Historical launch vehicle reliability is compared to system safety standards used in the commercial aviation industry to understand if future designs truly need a crew abort system.

The third paper "Quantification of Benefits for Medical Devices" is by Bijon Elahi. This paper proposes a methodology to quantify benefits, thereby creating more consistency, and clarity in the evaluation of benefits and the benefit/risk ratio.

The "TBD" column by Charlie Hoes discusses the difficulties one encounters when navigating our complex medical system.

As usual, I welcome your comments, letters to the editor and article submissions.

Regards,
Chuck

References

1. Denworth, L. "A Significant Problem," Scientific American, October 2019
2. Holz, R. L. "Most Science Studies Appear to Be Tainted by Sloppy Analysis" The Wall Street Journal, September 14, 2007