

Behavioural Scientists Doing Engineering



DA Sanders*

Professor of Systems Engineering, University of Portsmouth Anglesea Building, UK

Submission: July 25, 2022; **Published:** July 28, 2022

***Corresponding author:** DA Sanders, Professor of Systems Engineering, University of Portsmouth Anglesea Building, UK

Opinion

Engineers obviously use science to solve problems. They use physics for structural calculations to determine the loads that a building needs to withstand and the properties of the parts of its structure. They use biology and chemistry in ergonomics to making workers as comfortable and safe as possible. They use materials science to select suitable materials but behavioural science is also needed to get a job finished.

Negotiation is needed to achieve best value for contracts and materials. Power dynamics can deal with political and public opposition or interference. Reference Class Forecasting can be used to correct for bias and planning fallacies, especially tendencies to be over-optimistic with budgets and / or schedules, so that cost and time expectations are restrained. It is still true that engineering projects around the world tend to cost more than promised and to take longer. Engineers creating facilities and amenities need to approach human behaviour with the same respect shown to calculus or physics.

Behavioural science can be used to provide a more accurate view of how the public will perceive new engineering products, systems, works and constructions; nudges can be used to de-bias engineers wanting to create infrastructure that is more sustainable. Generally, engineering (and other large) projects have become so complicated that they cannot be bounded within a single academic discipline. Engineers can be comfortable solving problems using science and mathematics but they can be fooled by the obvious and exact solutions they achieve. Engineers can often solve and think about mathematical problems more than they socialize; it is only through working with other people that we learn what Emily Roeblings termed "know-how and common sense." Behavioural science teaches us about others and ourselves, helping engineers to learn about know-how and common sense. This can then be infused into their teaching and work, while staying close to their comfort zone.

As engineering evolves, then Behavioural Science training will become an essential addition. For example, Universities such as the University of Virginia have begun PhD Programs concerning Behavioural Science & Engineering within initiatives that bridge and fuse disciplines including engineering, science, business and medicine. But training is also needed at undergraduate levels and at school and engineers especially need it because they always design for people.

There may be a psychology (or similar) lecture or a couple of classes within some undergraduate engineering degrees but it would be better to implant whole sequences of behavioural science subject matter. This might help to solve some problems that could seem overly difficult or even unsolvable when only viewed through a traditional engineering lens. For example, we could make buses more popular by upgrading their engines or upgrading the roads to make trips faster but it might just be possible to make a bus ride more productive and fun instead. Rather than installing new engines and repairing or creating new roads, companies could invest in high-speed internet, more comfortable seating, or perhaps a cocktail-bar. That might only cost a fraction of the bigger engineering solutions, and then perhaps travellers won't mind if a bus trip was a little longer. A reality is that resources place a limit upon our ability to create more and more things (such as faster buses), but those limits may not apply to other things that we might desire even more: a better overall bus ride. Engineers need to consider human behaviour along with mathematics or physics. In taking that approach, engineers would also learn about quirks in their own behaviour and thinking, as engineering design is still dominated by human behaviour (or at least our models of that behaviour).

However, it is easier to consider what might be fixed by behavioural science rather than what behavioural science might make possible. Constructing a building is a tangible reminder of

all the work necessary to turn a scientific idea into something practical. Physics and mathematics inform but it is softer skills and human persistence that actually translates mathematical theory into a building. Applying a science requires its own knowledge and concentrated effort and that is where engineering comes in. Scientists can be engineers but the same people who will create new knowledge in behavioural science will probably not be able to imagine or describe everything that might be created with the new knowledge.

Real advances often come from people who are willing to cross academic and subject boundaries (for example behavioural science and engineering). When someone nudges they may also

engineer and the people applying behavioural science now might learn from the extensive history of engineering decision making and problem solving.

Leidy Klotz asked how might we move from solving problems with behavioural science to finding new ways to “do” with the science? What can behavioural science fix and what does behavioural science make possible?” What engineering and behavioural science accomplishments from now will be carrying passengers around in 100 years? What will transporting people or moving people mean in 100 years? These questions can only be addressed by behavioural scientists and engineers acting with each other in a partnership.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/PBSIJ.2022.19.556006](https://doi.org/10.19080/PBSIJ.2022.19.556006)

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission

<https://juniperpublishers.com/online-submission.php>