

# Risk and Opportunity in the Space of Possibilities

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Consider the different places you can be in a house. Living room, dining room, kitchen, bathroom. More specifically, consider each location to stand, sit or lie down. If there are several floors, then you can be in many different places on each floor. To get from one place to another, however, teleporting is not possible. We have to walk from one place to another through a set of intermediate places. To get from one place on one floor to a place on another floor, we have to walk up stairs, or take an elevator. The space of possibilities is the set of places that one can be in, along with the way they are arranged so that we can identify how to go from one place to another.

If there is a person who lives in a house, we might think about the space of possibilities of that person, which is different from the space of possibilities of the house itself because he doesn't ever stand in certain places in the house. We might also consider a map of the frequency / probability that he would be in a particular place as a characterization of his space of possibilities. Those locations are also connected to each other by the way he moves through the house and that is a map of the space of possibilities for that person. Another person who lives in the same house, or a person who visits the house would have a different space of possibilities.

Why is the space of possibilities important?

It tells you what you can and cannot do. It let's you know how you can go from one place to another. And for a specific individual it tells you important things about what they actually do compared to what is possible in principle.

My son, for example, explored the space of possibilities while climbing on a power plant near Cornell. Hanging by his hands, he almost crossed a span of a beam, but couldn't make it all the way. He dropped 20 feet, breaking both his legs.

Opportunity and risk are in the space of possibilities—where you haven't gone and where you might go, and what the consequences are.

Risks that occur in the existing space of possibilities are very different from risks that arise from expanding the space of possibilities.

Risks in the existing space of possibilities are known to some degree. How people respond to risks is a separate question.

The high risk of extreme sports and daredevil stunts is not just because they are doing dangerous things, but because they are trying to do things that have never been done before. Innovators who create new products are trying to expand the space of possibilities of what might be successfully done. The risks of financial failure for any

one startup are very high, but risks to life and limb are generally not. Scientists try to expand the knowledge that we have, opportunities and benefits from success exist. The down side risk of a particular failure is not usually high, but it includes reputational risk and wasted effort, undermining career objectives.

As to my son: We have ways of mitigating the consequences of his exploration: A plate and a dozen screws (see Fig. 1) have promoted healing. Still, the entire process, including surgery, pain, a lost semester, and ongoing healing are consequences to be considered in making decisions about the space of possibilities. While I think it is unlikely that anybody else did exactly the same thing, I am not convinced we should give him credit for expanding the space of possibilities explored by humanity.

It is, however, not enough to consider expanding on what human beings have done. Everybody on a daily basis navigates spaces that as individuals they have not encountered before. There are risks that they are taking. This is an important reason for communication, informally and through education, to share experience to reduce risk.

Two conclusions that apply to my son as to others. First, he might have learned a generalizable lesson from the experience of others that might have led to a better decision about risks in this context. Second, his experience might be of benefit to others who might learn not to repeat it.



FIG. 1: X-ray of my son's leg after exploring the space of possibilities in climbing a building.