
CONCEPTUAL SEMANTICS AND PUBLIC MESSAGING: “RISK–BENEFIT” DISCOURSE AROUND COVID-19 VACCINATION

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Abstract*

This study explores the conceptual semantics of risk–benefit discourse about COVID-19 vaccination and the implications for public health messaging. The underlying methodology is the natural semantic metalanguage (NSM) approach. The study proposes a semantic explication of the English word *risk* in one of its most frequently used frames in COVID-19 vaccine discourse (i.e. *the risk of ...*), as well as an “advice script” for the complex task of “weighing the risks and benefits” of a vaccination decision. Drawing on COVID-19 vaccination campaigns in Australia and Denmark, the study stresses the difficulties of communicating public health messages using conceptually complex and culture-specific words such as *risk*. Though the issues are complex, it is argued that adopting a minimal languages approach may provide a way forward, by enabling the creation of texts that are both easier to understand and more easily translated.

Keywords: risk, COVID-19, conceptual semantics, public health communication, vaccine discourse, natural semantic metalanguage (NSM)

1. Introduction

The language of “risks and benefits” was central to discourse about COVID-19 vaccination in 2021. Consider, for example, the case of “Vaxzevria”, often referred to as “the AstraZeneca vaccine” or simply

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“AstraZeneca”. Early in 2021, this vaccine was singled out for criticism from the press and government bodies and, as a result, public trust in the vaccine suffered (cf. Matute et al. 2021). On 25 January 2021, days before the vaccine was approved by European Medicines Agency (EMA), the German newspaper *Handelsblatt* published a story claiming that the vaccine’s efficacy was 8% in people over 65 (Boychev 2021). On 29 January, President Macron of France claimed similarly that the vaccine was ineffective for the elderly (Wise 2021). EMA approved the vaccine the same day (European Medicines Agency 2021c), but the public relations (PR) problem for the vaccine had just begun. The next blow for the vaccine was being linked to the adverse side effect of thrombosis in young women (European Medicines Agency 2021b). By mid-April, the roll-out of the vaccine had been restricted, suspended, or halted altogether in several countries, including Denmark (the first country to permanently suspend it) (Skydsgaard & Grønholt-Pedersen 2021) and Australia (restricted access for younger adults) (Brook 2021).

At this point, much damage to the vaccine’s reputation had been done, prompting a public statement from the EMA stressing that “the benefits of Vaxzevria outweigh its risks” (European Medicines Agency 2021a). Similarly, the Australian Technical Advisory Group on Immunisation (ATAGI) released a statement saying: “The benefit of vaccination in preventing COVID-19 with COVID-19 Vaccine AstraZeneca outweighs the risk of TTS (Thrombosis with Thrombocytopenia Syndrome)” (Australian Technical Advisory Group on Immunisation 2021). Thus, the concepts of “risk” and “benefit” became central to public discourse surrounding COVID-19 vaccines.

Risk is a concept central to health, insurance, security, and business discourse. As discussed shortly, the concept has been scrutinised by many scholars (cf. Luhmann 1990; Fillmore & Atkins 1992; Hamilton et al. 2007; Aven & Renn 2009; Rosa 2010; Merckelsen 2011; Boholm 2012). It can almost be said that *risk* has a scholarly field of its own, given the existence of dedicated journals such as *Journal of Risk Research*, *Risk Analysis*, and *Risk Management*. In the first part of this paper, we look briefly into the multiple uses of the English word *risk*, both as a noun and as a verb, and at attempts by lexicographers, risk researchers, and linguists to define *risk*. These attempts, we argue, have been greatly hampered by reliance on excessively complex defining vocabulary.

In the second part of the paper, we apply the methodology of the natural semantic metalanguage (NSM) to develop a non-circular and non-technical semantic explication of the noun *risk*, not in general, but as used in the main grammatical frame in which it is found in COVID-19 vaccination discourse, namely, *the risk of ...*. From there, we go on to propose an advice script that clarifies the complexities involved in “weighing the risks and benefits” of vaccination, as recommended by public health authorities in many countries. This exercise helps shed light on how and why vaccination communication efforts can fall short.

In the third part of the paper, we move into the territory of risk communication. Here we argue that adopting a minimal language approach, that is, striving to express key ideas using the simplest and most accessible language possible, can greatly assist effective public messaging. Part four of the paper consists of concluding remarks.

Through the paper, our arguments are supported by corpus evidence from English and, for comparative purposes, Danish, as well as by conceptual analysis.

2. Uses of *risk* and previous attempts to define it

The English word *risk* comes from French *risqué* and Italian *risco*, ‘to run into danger’ (OED Online 2021a). The word is first attested in the 1650s as a noun, and later, in the 1660s, as a verb (OED Online 2021b). By 1719, the word was additionally used in the sense “hazard of the loss of a ship, goods, or other properties”, which fostered the modern extension to economic usage. Danish *risiko* ‘risk’ comes also from Italian *risco* (Den Danske Ordbog 2022).

In modern English, *risk* is used in an array of contexts, which complicates capturing its semantic complexity. Additionally, the English noun and verb *risk* are homonymous whereas in Danish, by contrast, the noun *risiko* is distinct from the verb *risikere*. To anticipate, in this paper we will primarily focus on the usage and semantics of English *risk* as a noun in health-related discourse. A previous corpus-based study (Hamilton et al. 2007) suggested that this is the most common usage of the word in English.

To see if this finding could be corroborated, we investigated examples of *risk* in three English language corpora: British National Corpus (Davies 2014), English Web 2020 (enTenTen2020) (Jakubíček et al. 2013), and Timestamped JSI web corpus 2014–2016 English

(Bušta et al. 2017), and, to compare, one Danish corpus: Danish Web 2020 (daTenTen2020) (Jakubiček et al., 2013). These were accessed and handled through online corpus tool Sketch Engine (2022). Frequency searches (so called “Wordlists”) across all four corpora revealed that *risk* (noun) was indeed more prevalent than *risk* (verb) (see Table 1), in both English and Danish. Further, a thematic analysis of 100 randomised entries was conducted of the noun *risk* from each of the corpora, under four main themes: health, business, security, and personal attribute (*he’s a risk taker*).¹ In the BNC 2014 Spoken and both the TenTen corpora, the theme of health (including injury/death) was the most prevalent, with 23 (BNC), 39 (enTenTen2020), and 44 (daTenTen2020) entries (out of 100), respectively. In the Timestamped JSI corpus, the theme of health was an equal first with business, both tied at 28 entries (out of an eligible 95).

Corpus ²	Risk (noun)	Risk (verb)
British National Corpus (BNC) 2014 Spoken	291	89
English Web 2020 (enTenTen2020)	8,221,551	551,616
Timestamped JSI web corpus 2014–2016 English	3,927,835	302,488
Danish Web 2020 (daTenTen2020) ³	578,822	162,284

Table 1: Frequency of the noun “risk” versus the verb “risk” across four corpora.

To approach the topic of the meaning (or meanings) of the noun *risk*, we begin with the observation that there is conceptual overlap with related words, such as *danger*, *hazard*, *chance*, and *possibility*. It is unfortunate, therefore, that dictionary definitions and scholarly

¹ Some entries were disqualified because they were, for example, a proper noun (e.g. the game “Risk”) or verb usage. In total, the theme of health amounted to 23 out of 89 eligible entries for BNC and 39 out of 95 eligible entries for TenTen.

² For the English corpora, the numbers must be considered with a certain degree of leniency, as data revealed that the part of speech classifications in the corpora are not entirely accurate in all cases. However, they are overwhelmingly correct.

³ *Risiko* (noun) vs. *risikere* (verb).

discussions alike tend to draw on these related words in different ways, creating complex and potentially confusing webs of words. For example, the Merriam-Webster dictionary lists four senses of English *risk*, including “someone or something that creates or suggests a *hazard*” and “the *chance* that an investment (such as a stock or commodity) will lose value” (added italics) (Merriam-Webster Dictionaries 2021b). Similarly, the first meaning of the noun *risk* in the *Oxford English Dictionary* (OED) is: “1. (Exposure to) the *possibility* of loss, injury, or other adverse or unwelcome circumstance; a *chance* or situation involving such a *possibility*. Frequently with *of*” (added italics) (OED Online 2021a). The danger of circularity is evident. For example, Merriam-Webster’s definition of *hazard* contains the words *chance*, *danger*, and *risk* (Merriam-Webster Dictionaries 2021a). Additionally, it becomes difficult to pinpoint how different in content such definitions are or are intended to be.⁴

When dictionaries attempt to differentiate between *danger*, *risk*, and *hazard*, the results are often unhelpful, raising as many questions as they may seem to answer and often amounting to little more than “word salad”. For example, Merriam-Webster’s *Word Central* (2007), a dictionary for children, includes the following note (which, incidentally, introduces another near-synonym, *harm*):

DANGER, HAZARD, and RISK mean a chance of loss, injury, or death. DANGER is used for a harm that may or may not be avoided. This animal is in danger of extinction. HAZARD is usually used for a great danger. They’re trying to reduce the hazards of mining. RISK is used for a chance of danger that a person accepts. There are risks that come with flying a plane.

We will not comment further on the lexicography of *risk* here, passing instead to a brief review of the scholarly literature on the *risk*

⁴ Occasionally, a dictionary makes an effort to employ simpler wording, such as when the *Cambridge Learner’s Dictionary* uses the expression “the possibility of something bad happening” (Cambridge Advanced Learner’s Dictionary & Thesaurus 2021), rather than the OED’s “possibility of loss, injury, or other adverse or unwelcome circumstance”, but these efforts are sporadic.

concept.⁵ Three scholarly definitions (or, better, characterizations) are given in Table 2 below.

Luhrman (1990:225)	“The possibility of future damage, exceeding all reasonable costs, that is attributed to a decision.”
Aven and Renn (2009:6)	“Uncertainty about and severity of the events and consequences (or outcomes) of an activity with respect to something that humans value”
Rosa (2010:240)	“A situation or event where something of human value (including humans themselves) is at stake and where the outcome is uncertain.”

Table 2: Selected scholarly definitions/characterizations of the risk concept

The scholarly definitions in Table 2 are at least as prone to relying on complex and abstract defining terms as their lexicographical counterparts. One may also observe disagreement about whether *risk* implies attribution to a “decision” (Luhmann 1990) or to an “activity” (Aven & Renn 2009), or simply to a “situation or event” (Rosa 2010). These differences partly align with their respective author’s standpoints on how closely the concept of *risk* aligns with those of *danger*, *hazard*, and *chance*; see Merkelsen (2011). This is familiar territory from the perspective of lexicography but here it appears to be driven by an additional factor, the importance of *danger* and *hazard* as technical or semi-technical terms in the risk management and risk assessment literature (cf. Simpson et al. 2021).⁶

The most notable treatment of *risk* within linguistics is the frame semantic analysis of Fillmore and Atkins (1992). A frame in their sense is not a linguistic meaning, but a knowledge structure which is “presupposed by the concepts encoded by the words” (1992:75). They propose a RISK frame using different categories or frame elements, such as Chance, Harm, Actor, Deed, Gain, Situation, and Valued

⁵ We are presently unaware of any semantic differences between English *risk* and Danish *risiko*. Additionally, it seems that barely any literature has been published specifically about the semantics of Danish *risiko*. Our discussion of scholarly definitions of *risk* has therefore focused on the English language.

⁶ Relatedly, one can note unusual phrasing about what “humans value” in two of the scholarly definitions/characterisations, presumably linking with mainstream economic theory, in which a technical concept of “value” plays a key role.

Object. Their treatment is distinctive in that they recognise a multiplicity of different lexicosyntactic patterns or constructions. For the verb alone, Fillmore and Atkins identify as many as 21 distinct patterns, each of which can selectively highlight different possible frame elements and/or introduce additional semantic material. This amounts to recognising a great deal of constructional polysemy. In broad terms, the present authors agree with this position. There have also been a number of valuable corpus-based, discourse analytic studies of *risk* and related words, for example, Boholm (2012), Hamilton et al. (2007), Merkselnsen (2011).

To give an impression of the array of constructional contexts for *risk*, consider the non-exhaustive list of examples in 1–4 below, based on OED and Fillmore and Atkins (1992). They show *risk* as a verb, 1; *risk* in light verb and prepositional combinations, 2; *risk* as a stand-alone noun, 3; and *risk* as a noun modifier, 4. Danish verb *risikere* and noun *risiko* can be used similarly—compare results from daTenTen2020 (Jakubiček et al. 2013).

- (1) a. They risked their lives every day.
b. He was willing to risk everything for love.
c. I didn't want to risk shooting so near to him.
d. I didn't dare risk a pause (a backward glance, etc.)
- (2) a. We decided to take the risk.
b. We didn't want to run the risk of being found out.
c. at risk, at (the) risk of ...; the risk to ...
- (3) a. a low/high risk (of), an increased/decreased risk (of), little or no risk (of)
b. to reduce the risk of flooding (infection, etc.)
c. breast cancer risk, health risk, security risk; a flight risk, a credit risk
- (4) a. risk averse, risk-taking, risk-loving
b. a risk factor; risk assessment, risk management, risk analysis

Interestingly, Fillmore and Atkins (1992) recognise two RISK subframes, one where the Harm is regarded as resulting from someone’s action, and the other not. Some constructional contexts are open to either interpretation, while others, for example, the expressions “take risk” and “run risk”, imply some form of agency (doing); see Boholm’s (2012) corpus-based study, which concluded that *risk* sometimes included an aspect of decision-making,⁷ while this was never the case for *danger*.

A neglected aspect of *risk*, in our view, is that of “quantification”; that is, the idea that the *risk* of a bad outcome can sometimes be calculated and quantified. In many contexts, we believe this is integral to our understanding of risk. We know that some professionals, for example, insurance experts and epidemiologists, can calculate and quantify risks. With reference to expressions such as “know/understand/appreciate/calculate the risk”, Fillmore and Atkins (1992:85–86) already noted that they

support the idea that some uses of the noun represent something computable, the computation involving the negative value of the Harm, the positive value of the intended Gain, and the probabilities associated with each.

Though much of the risk literature also seems to take this for granted, it is not usually mentioned explicitly. Interestingly, the OED traces this usage or meaning back to the 1600s, connecting it with insurance and with “the possibility of financial loss or failure as a quantifiable factor ... in a commercial enterprise or investment”.

Here are some examples of this “expert” quantified usage of *risk* from the health domain in English and Danish.

- (5) a. There was a 1% increase in the risk of dying from alcohol-related causes (JSI)
- b. Of these patients, 35% had intermediate-risk disease and 65% had adverse risk disease. (enTenTen2020)
- c. The risk of death after the diagnosis of a COVID-19 infection during Victoria’s 2020 outbreaks was 4

⁷ Note that this does not necessarily entail a decision in the literal sense; more like deliberate action.

percent overall but was estimated to be 10 times higher among the elderly. (University of Sydney 2021)

- d. *Risikoen for at blive syg var 42 procent højere blandt mænd, som ikke var i tilstrækkelig kontrol over deres arbejdssituation.*

‘The risk of getting sick was 42 percent higher among men who were not in adequate control of their work situation.’ (daTenTen2020)

In these examples, the quantification is presented using percentages and ratios, but it can also be presented using fractions; for example, “a one in ten chance of being hospitalised”. Even when numbers are not explicitly used, they are often implied by modifiers, in expressions such as *high risk*, *low risk*, *moderate risk*, and the like. (There is more on quantification and risk in the section ‘The challenge of COVID-19 risk messaging’.)

3. The conceptual semantics of “risks and benefits”

We now present our own, rather selective, analysis of the conceptual semantics of the English noun *risk*, concentrating on its role in COVID-19 discourses. The underlying methodology is the natural semantic metalanguage (NSM) approach. As is well known, the key feature of this approach is its use of simple, cross-translatable words as a metalanguage in which to unpack the meanings of words and constructions (as semantic explications) and/or to spell out shared understandings (as cultural scripts); see Goddard and Wierzbicka (2014); Goddard (2021c).

We do not seek to cover the full range of meanings or uses of the noun *risk*, but rather what we take to be its predominant meaning in the context of COVID-19 discourse. In [A] below we propose a semantic explication of the noun *risk* in one specific grammatical frame or construction, namely: *the risk of (something bad happening)*, with (i) definite article *the*, (ii) a prepositional phrase with *of*, (iii) in which the noun phrase designates an identifiable “bad event”,

typically expressed with a noun or noun compound.⁸ Some examples from the domain of health:

- (6) a. the risk of death, injury, suicide, infection, allergies ...
- b. the risk of heart disease, breast cancer, post-concussion syndrome ...
- c. the risk of blood clots, the risk of hospitalisation, the risk of serious disease ...

Our basic proposition is that the “the risk of (something bad happening)” construction embodies a fairly complex package of assumptions, which can be unpacked as per explication [A] below. The explication is presented in three sections. Section (a) begins with a “factual” framing component “it is like this: ...”, identifying that “something bad (of one kind) can happen to people” and that it can be known that “something like this happened to some other people before”; that is, there is an empirical knowledge base about such events.

Section (b) states that people would prefer such things not to keep happening and that because of this, some people (not necessarily those directly affected) are prepared to undertake certain actions if they can, provided that they can know what to do.⁹

From here, the explication continues, per section (c), that in considering possible actions people should bear in mind that “some people know a lot about such things”. Specifically, these people (i.e. experts) know how many people were and were not affected by the prior bad events, and, moreover, “they know many other things about these people”, for example, demographic information. This enables them to know “how such things will happen afterwards”.

⁸ Noun-based complements typically reflect stable event categorisation, as opposed to gerund complements, which are much more flexible and often not implicitly quantifiable; for example, *the risk of being double-crossed*, *the risk of losing their jobs*, *the risk of causing a spike in inflation*.

⁹ The word “we”, used in section (b), is not a semantic prime but a “semantic molecule” (Goddard & Wierzbicka 2021).

[A] A semantic explication for *the risk of ...* (e.g. bad side effects, serious illness, hospitalisation)

- (a) it is like this:
something bad (of one kind) can happen to people
people know this because they know that it happened to some other people
before
- (b) people don't want this to happen as it happened before
because of this, some people often think like this:
“we want to do something if we can, we want to know what is good to
do”
- (c) these people can think like this at the same time:
“some people know a lot about such things
they know how many people it happened to before, they know how
many people it didn't happen to before, they know many other
things about these people
because of this, they can know how such things will happen
afterwards”

Explication [A] highlights the cognitive framing that comes with talking about “the risk (or risks)” connected with getting COVID-19. Specifically, the framing in terms of prior known events (section a), the idea that it warrants collective thinking and planning (section b), and the implication that there is an expert or specialist discourse surrounding the topic (section c). We cannot pursue the contrastive semantics of related concepts such as “danger” or “safety” here, but see, for example, Levisen and Ye (forthcoming).

As noted in the introductory section, COVID-19 vaccine discourse is not about “risk” alone. It is equally about “benefits”; specifically, about the balance or relative importance of the potential future consequences, good and bad (cf. European Medicines Agency 2021a; Leask et al. 2021; Wise 2021). The term *benefits* (hardly an everyday word) is likely to have been taken into health contexts from business parlance, from expressions like *cost–benefit analysis*. In any case, the phraseology about benefits outweighing risks, or vice versa, is extremely common in English and Danish health discourse generally. See the examples in 7 below, and the corpus figures compiled in Table 3.

- (7) a. Your doctor and you will decide if the benefits
outweigh the risk of using Depocyt. (enTenTen2020)

- b. COVID-19 vaccinations should continue in the country, echoing rulings from regulators elsewhere that the benefits outweigh the risks of side effects. (JSI)
- c. The FDA has reviewed the clinical trial data on Pfizer’s vaccine for children and concluded that the benefits of the 2-shot series outweigh its risks for kids. (Goodman 2021)
- d. *Når det bruges i den rigtige sammenhæng, især i postmenopausale kvinder under 60 år, for hvem fordelene opvejer risici, er menopausal hormonbehandling effektiv til både forebyggelse og behandling af osteoporose.*

‘When used in the right context, especially for postmenopausal women under the age of 60 for whom the benefits outweigh the risks, menopausal hormone therapy is effective in both the prevention and treatment of osteoporosis.’ (daTenTen2020)

Corpus ¹⁰	Most frequent “and/or” collocations of <i>risk</i> (number of occurrences)
English Web 2020 (enTenTen2020)	<i>benefit</i> (42,263), <i>cost</i> (29,112), <i>risk</i> ¹¹ (28,432), <i>opportunity</i> (19,305), <i>uncertainty</i> (18,932), <i>health</i> (10,570)
Timestamped JSI web corpus 2014–2016 English	<i>uncertainty</i> (70,651), <i>risk</i> (18,554), <i>cost</i> (13,159), <i>benefit</i> (10,418), <i>reward</i> (6,471), <i>opportunity</i> (5,982)
Danish Web 2020 (daTenTen2020)	<i>fordel</i> ‘benefit’ (674), <i>mulighed</i> ‘possibility’ (557), <i>omkostning</i> ‘cost’ (312), <i>usikkerhed</i> ‘uncertainty’ (306), <i>afkast</i> ‘yield’ ¹² (303), <i>bivirkning</i> ‘side effect’ (247)

¹⁰ The BNC corpus data on this is insignificant. The most frequent “and/or” collocation for *risk* in BNC had only two occurrences.

¹¹ In contexts such as “infection risk and risk of sepsis”.

¹² Financial concept.

Table 3: The six most frequent “and/or” collocations of risk (noun) in two large English corpora and one Danish corpus

While strongly recommended by public health authorities, COVID-19 vaccination was not mandatory in 2021 in Australia or in Denmark. It was a matter of individual choice. People were advised or expected to weigh up the risks and benefits and make their own decision. For example, Sundhedsstyrelsen (Danish Health Authority) released an online series of videos designed to aid people in their COVID-19 vaccination decision (Sundhedsstyrelsen 2022). In Australia, the National Centre for Immunisation Research and Surveillance (NCIRS) created an online “COVID-19 vaccination decision aid” (NCIRS 2022) to help the public in their decisions. The five-step decision aid stated: “To make the decision that’s best for you, it’s useful to think about how the risks associated with COVID-19 compare with the risks of vaccination”. Steps 2–4 are about identifying risks and benefits, applying these to one’s own personal situation, and prioritising them. (cf. Figure 1).



Figure 1: Screen capture from the NCIRS COVID-19 vaccination decision aid (NCIRS 2022)

There can be a myriad of consequences, including some that go beyond the individual’s health. In 2021, someone who decided against COVID-19 vaccination could face social disapproval or exclusion if the people around them disagreed. There could be more official social consequences too; some national or state governments, such as Queensland in Australia, imposed restrictions on unvaccinated individuals, preventing them, for example, from accessing hospitality venues (Queensland Government 2021). Additionally, there are risks and benefits that impact not only a single individual considered in isolation from others, but also that person’s family, friends, and the

wider community (social benefits). For example, a young and healthy person who may be confident of his or her ability to withstand COVID-19 infection may still consider it a benefit not to feel responsible for potentially infecting older or more vulnerable family members; or, more broadly, consider it a benefit to contribute towards “re-opening” after lockdown or easing of restrictions on international travel. Furthermore, not all (potential, future) risks and benefits are necessarily evident at the time of a vaccination decision.

According to Leask and colleagues (2021), weighing the risk and benefits of COVID-19 vaccinations is an immensely difficult task for the individual, which can involve taking “mental shortcuts” (2021:10) to allow for decision-making when dealing with large amounts of information. Such mental shortcuts can entail that people overestimate the risk of something—such as a low risk side-effect like thrombosis—either because it is difficult to gauge how a risk percentage or fraction applies to an individual’s situation, or because it is so publicised in popular media that it leads to a perception of higher risk.

Figure 2 illustrates some of the potential perceived risks and benefits of the COVID-19 vaccination¹³ decision-making process faced by Australian and Danish individuals in 2021.¹⁴

¹³ In this, we discuss some of the perceived risks of COVID-19 *vaccination* only. For a detailed discussion on the perceived risks of COVID-19 itself (among Australians), see Lupton and Lewis (2021).

¹⁴ These provide some perceived risks and benefits of COVID-19 vaccination. These are based on the authors’ observations of public discourse in Denmark and Australia at the time, 2021, as well as the risk and benefits of the vaccine decision aids of Sundhedsstyrelsen (2022) and NCIRS (2022), and public COVID-19 vaccine perceptions, as found in Matute et al. (2021) and Seale et al. (2021).

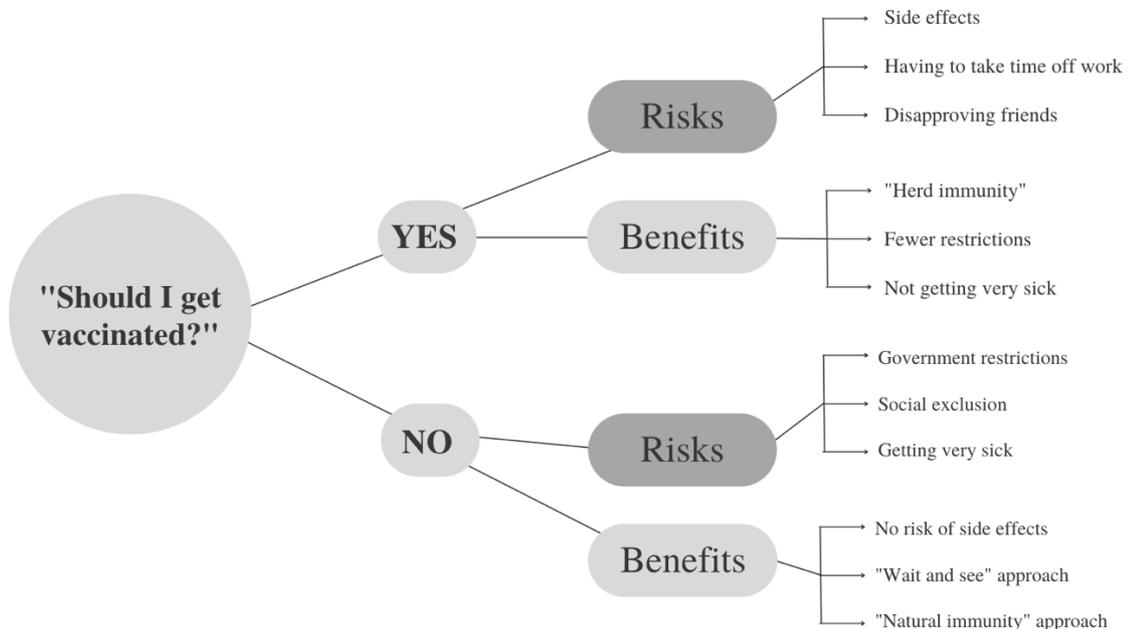


Figure 2: Example of the perceived (potential) risks and benefits of an individual's COVID-19 vaccination decision

In [B], we propose a script that unpacks the complex content of advice to weigh the risks and benefits of COVID-19 vaccination, as recommended by public health authorities. This script is not an explication but an attempt to represent the processes that are implied when people are advised to “weigh the risks and benefits”. Section (a) presents what follows as advice (“it is good if people can think like this: ...”). Section (b) presupposes a person recognising that they face a choice (“I can do something if I want ... I don’t have to do it”). Section (c) advises thinking about it “in two ways”: one way assumes that there can be some bad outcomes and that one should find out more and think about it well; the other way assumes that there can be some good outcomes and that one should find out more and think about it well. Section (d) expresses confidence that “if I think like this for some time, I can know what to do”. Note that the implied recommendation to find out more effectively cues people to pay attention to “the experts”.

[B] A script for advice to *weigh the risks and benefits* (of COVID-19 vaccination)

- a. it is good if people can think like this:
- b. “I know that I can do something if I want (e.g. get COVID-19 vaccination)
at the same time, I know that I don’t have to do it
- c. before I do anything, it is good if I think about it in two ways:
 - I know that if I do this, some bad things can happen because of it
I want to know more, I want to think about it well
 - I know that if I do this, some good things can happen because of it
I want to know more, I want to think about it well
- d. if I think like this for some time, I can know what I want to do”

This task of “thinking in two ways” appears to be supported in an embodied fashion by a “weighing options” bilateral palm-up open-hand gesture (cf. Parrill et al. 2022:25). When discussing risks and benefits, people often hold their hands in front of them, lifting one above the other, as if imitating scales or literally gauging the relative weight of two objects. See Figure 3.

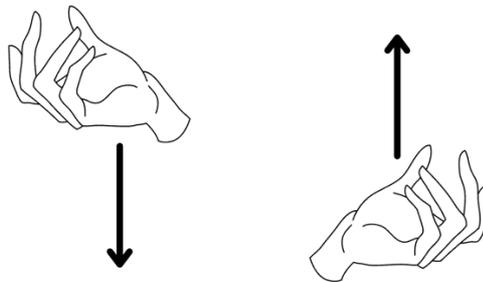


Figure 1: The “weighing options” gesture

In sum, the COVID-19 vaccination decision in 2021 involved individuals making a choice that involved a complex cognitive task of weighing individual as well as societal risks and benefits, including both health and social factors. It is no wonder that many people appeared to be unable or unwilling to undertake the task and adopted a “wait and see” attitude. Nor is it surprising that some people decided to “do their own research” on social media or on the open internet, perhaps falling prey to confusing information, misinformation, or disinformation.

4. The challenge of COVID-19 risk messaging

Deliberating risks and benefits is a taxing undertaking for any individual. Considering this, it is widely accepted that clear and

accurate risk–benefit communication is crucial to public trust in, for example, a vaccine. However, there is often a discrepancy between how health is communicated and the communication needs of the public (Nielsen-Bohlman et al. 2004; Gazmararian et al. 2005; Kripalani & Weiss 2006; Mitchell et al. 2019; Olson & Windish 2010). For example, it is known that written COVID-19 information across countries exceeds appropriate readability levels (Mishra & Dexter 2020; Ferguson et al. 2021). This issue is further complicated during epidemics. While routine public health threats such as influenza can be somewhat predicted, novel outbreaks, such as the 2019–2020 pandemic outbreak of COVID-19, require health communicators to work under time pressure, sometimes having few days to organize widespread messaging (Li et al. 2020). Further, there may not be resources to engage translators.

In some cases, government bodies use machine translation to achieve large-scale translations fast. It was reported that the Australian government did this during COVID-19 in 2020, and that the resulting translations were of poor quality (Dalzell 2020). In Denmark, translated information about COVID-19 was unavailable at the beginning of the country’s COVID-19 outbreak in 2020 (Brønholt et al. 2021).



Figure 2: Australian COVID-19 vaccination campaign poster, “Get vaccinated” (Australian Government Department of Health, 2021)

To provide concrete examples of 2021 risk messaging, we can examine two similar Danish and Australian COVID-19 vaccination messages, one with and one without explicit use of the term *risk*: see Figures 4 and 5. The Australian “Get vaccinated” poster in Figure 4 states that: “The **risk** of catching COVID-19 in your area is high”,¹⁵ but leaves it to the reader to infer that getting vaccinated will actually reduce this risk. Further, although saying that *the risk ... is high* implies that it is quantifiably “very likely” that you will catch COVID-19, there is nothing to concretise what this means for an individual reader. Though the poster uses seemingly “plain” English words and short sentences, there is a high density of information contained in those few words. The very succinctness of the poster may undermine its effectiveness.

¹⁵ The expression “in your area” is a little unusual and, in our opinion, could be confusing or distracting. To our ears, “in your local area” would be clearer and more familiar, echoing the expression “local government area” (or LGA), often used in official health announcements in Australia.

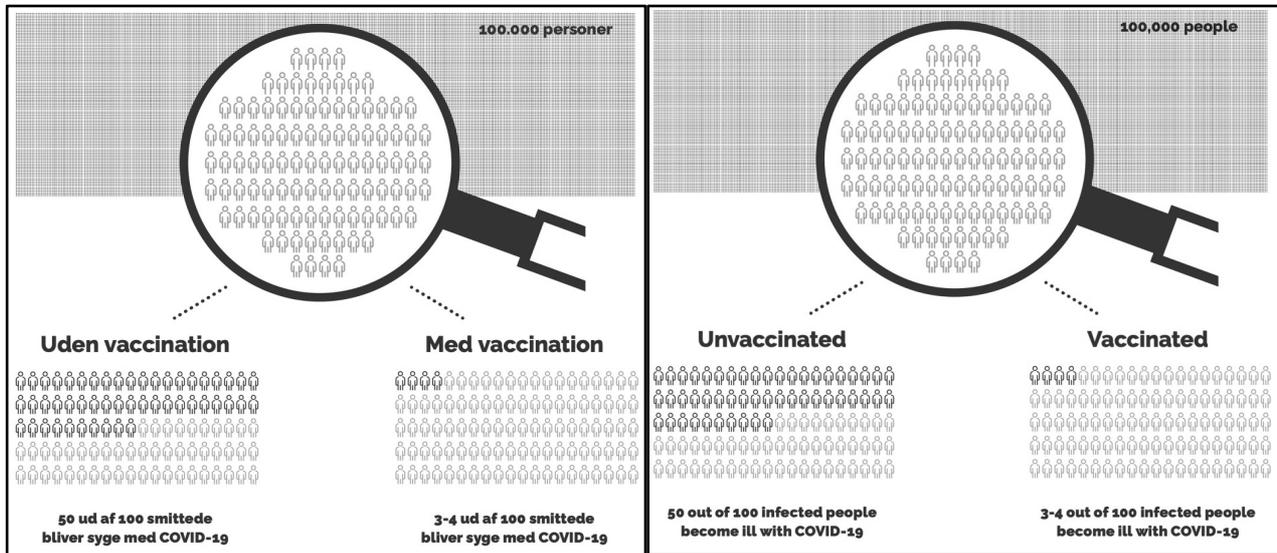


Figure 3: Danish infographic illustrating the benefits of widespread vaccinations. Left: Original version. Right: Official translated version (Sundhedsstyrelsen, 2021).

Figure 5 shows an infographic from a Danish vaccination pamphlet (Sundhedsstyrelsen 2021). It is shown in its original Danish version (at the left) and in English translation (at the right). In contrast to Figure 4, the Danish infographic does not use the term *risk* (Danish *risiko*), but rather uses a very detailed graphic display to visualise the societal benefits of vaccination. In effect, it illustrates the quantifiable risk that a person will ‘become ill’ (Danish *blive syg*) with COVID-19 in unvaccinated versus vaccinated populations. Despite their greater explicitness, however, the diagrams in Figure 5 are hardly straightforward to understand. The text on the preceding page in the pamphlet provides an explanation for how the numbers are calculated:

An infection rate (incidence) of 100, for example, means that 100 people per 100,000 inhabitants have tested positive within the last 24 hours. If we assume that about half of these also have symptoms, i.e., have become ill with COVID-19, then the effectiveness of the vaccines—if everyone was vaccinated—would mean that only 3–4 of the infected individuals would become ill with COVID-19, while 50 people would become ill if no one was vaccinated.

The reasoning in this passage, and its use of complex terms like *infection rate* and *inhabitants*, pose challenges to intelligibility.

These two examples reflect different approaches to communicating a similar message about COVID-19 vaccination. The Australian poster used words to communicate about the likelihood of catching COVID-19 without vaccination, relying on the key expression *high risk*. The Danish infographic did not use the term *risk*, but used a pair of diagrams to illustrate how vaccination impacts the likelihood of getting ill from COVID-19. In both examples we have identified potential problems with intelligibility and widespread accessibility.

5. A way forward for more accessible health risk messaging

The vaccination messaging examined above illustrated some of the challenges of communicating using the complex concept *risk*. We suggest that the minimal language approach (an adaptation of NSM, cf. Goddard (2021b); Diget (this volume)) can offer benefits in this regard. The minimal language approach creates accessible communication using cross-translatable words and grammar (Goddard 2018), and, when applied in English, helps minimise the impact of linguistically encoded Anglocentric views and biases (Wierzbicka 2014).

To illustrate how this approach can be applied to risk communication, we can examine an example of a minimal language text about COVID-19 vaccines. The text is written with children in mind. This is because parents and health providers may find themselves needing to explain the COVID-19 vaccines to children, and in such cases, using a complex and semantically rich concept like “risk” may not be helpful. The Australian federal government has a pamphlet with advice for how to talk to children about COVID-19 vaccines (Australian Government Department of Health 2021b). The pamphlet includes advice about how to respond to questions such as “What is a vaccine?”. The pamphlet suggests answering “A vaccine is a medicine that helps people fight a virus if they come in contact with it. It can stop people from getting very sick.”. While this explanation has elements that are clear, and does not use the word “risk”, there are aspects that may be unclear to children: for example, what does it mean (to a child) to “**fight** a virus”? How does one “**come in contact with** a virus”?

With the following text, we illustrate how the minimal language approach can be used to explain COVID-19 vaccines to children. The text is adapted from Goddard (2021a) and is presented here in Minimal English and Minimal Danish:

A Minimal English text for children about COVID-19 vaccines:

Everyone knows that many people are getting sick because of coronavirus. Because of this, it is good for everyone if they can have something called "COVID-19 vaccine" in their bodies. It is good because when COVID-19 vaccine is in someone's body, some good things happen in their body because of it. After this, most people won't get very sick if there is coronavirus in their bodies.

A Minimal Danish text for children about COVID-19 vaccines:

Alle ved, at mange mennesker bliver syge på grund af coronavirus. På grund af det, er det godt for alle, hvis de kan have noget, der hedder "COVID-19-vaccinen" i deres kroppe. Det er godt, fordi når COVID-19-vaccinen er i nogens krop, sker der nogle gode ting i deres krop på grund af det. Efter det bliver de fleste mennesker ikke særlig syge, hvis der er coronavirus i deres kroppe.

In addition to using words that are easy for children to understand, the two texts are nearly word-for-word identical in English and Danish, illustrating the ease of translating minimal language texts.

Children are just one demographic who can benefit from messaging using the minimal language approach. The approach's reliance on cross-translatable words and grammar makes it also appropriate for health communication intended for translation and for non-native speakers of a majority language.¹⁶ Needless to say, what strategies work best for effective communication depends on the target demographic. For example, it may be that most members of the target audience of the Danish vaccine pamphlet are able to meaningfully understand how an incidence rate of 100 relates to their

¹⁶ For more in-depth discussions on how the minimal language approach can be of benefit in a health context, see Diget (2021a, 2021b); Goddard (2021a).

own risk of catching or getting ill from COVID-19 with or without vaccinations.

In our opinion, however, a key point about communicable disease threats, such as COVID-19, is that related public health messaging is often intended for all members of the public, that is, for everyone. For example, it is also targeted at members of the community who may not be fully proficient in the majority language. It is also targeted at parents, who are held responsible for teaching their kids behaviours such as physical distancing and use of masks. It is in such communication scenarios where the minimal language approach can be of greatest benefit. After all, if this communication is intended for everyone, should it not be authored so that the largest number of people have the best possible chance of understanding it, learning from it, and passing it on?

6. Discussion

Returning to the example of the PR crisis of the *Vaxzevria* (AstraZeneca) vaccine, while the vaccine met all regulatory requirements (Wise 2021), early communication about the vaccine clearly fell short. Part of the problem could be rooted in the communication of *risks* and *benefits*. Communicating these effectively and adequately to all groups of a population is an incredibly complex issue. As we have illustrated in this paper, deciding whether to get a COVID-19 vaccine is a challenging cognitive task that involves thinking through the consequences at both individual and societal levels, including potential future consequences. Additionally, as illustrated through exploration of the Danish and Australian vaccination campaign efforts, understanding how numbers (ratios, proportions, percentages), such as infection rates, apply to a given individual based on factors such as gender, age, and location, complicates this task even further. Considering this, we can begin to understand some of the areas where public messaging about vaccination can fall short, and how public distrust in a vaccine can take root.

In this paper, we presented a semantic explication of *risk*, in one widely used grammatical frame in COVID-19 vaccination discourse in 2021 (*the risk of ...*), as well as a script modelling the mental tasks implied by advice to “weigh the risks and benefits”. Through this method, we have highlighted the semantic complexities of the word *risk*. We suggest that this method can be used to explore public

discourse in future research, including recurrent expressions and themes of anti-vaccination and “anti-mandate” discourses and in (at the time of writing) newer COVID-19 discourses, such as those concerned with “living with the virus”.

Further, we have argued that public health messaging can benefit from being authored according to minimal language principles, the central argument being that if public health communication is intended for everyone, more emphasis should be put on creating accessible and cross-translatable communication to the benefit of demographics that may need it, such as children, adults with below-average reading proficiency, and people from culturally and linguistically diverse backgrounds.

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