

How to express the appropriate level of confidence when reporting research results

KAMJE Writing Workshop
January 31, 2015

Jocelyn Graf
Owner and Principal Consultant
Proficia
Biomedical Editing and Translation

1. Showing Confidence about an Idea

Example:

Basic statement: An increase in smoking among teenagers caused long-term health problems.

When the proof of your idea or data is clear, you should express more confidence. When the idea has less support or evidence, you should express less confidence. Below are some examples of showing more or less confidence.

Examples of Expressing More Confidence:

An increase → A sharp increase
caused → undeniably caused, clearly caused, undoubtedly caused, must have caused, etc.
long-term health problems → widespread long-term health problems

You could also add expressions to the beginning of the sentence:

It is clear that an increase . . .
A great deal of evidence leads us to conclude that an increase . . .
We must conclude that an increase . . .

Examples of Expressing Less Confidence:

An increase → a probable increase
caused → may have caused, seemed to have caused, contributed to, was one cause of, etc.

Again, you could also add expressions to the beginning of the sentence:

We have reason to believe that an increase . . .
It is possible that an increase . . .

2. Using modals to express varying levels of confidence

Each of the modals (can, may, could, etc.) can express a different level of confidence about an idea. In fact, modals are probably the most common way to show the level of confidence. However, they are very difficult to define for English learners. There is no exact translation among different languages. Therefore, they are easier to understand through examples. Below is a set of examples of the modals moving approximately from greatest to least confidence.

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	Description	Examples
<p>Past and present: no modal. Just a regular verb</p> <p>Future: WILL</p>	<p>Giving generalizations: statements that people in the field generally agree on</p> <p>OR</p> <p>Citations: Summarize the findings of others (report, describe, demonstrate, show, prove, etc.).</p> <p>OR</p> <p>Reporting certain results: May be proven mathematically. (Rare in biomedical science.)</p> <p>AND</p> <p>Predictions: No or little doubt about the future.</p>	<p>Generalization:</p> <p>1. Prevalence of mixed depression, a combination of depression and manic or hypomanic symptoms, is high in patients with bipolar disorders.</p> <p>Benazzi F. Bipolar disorder—focus on bipolar II disorder and mixed depression. <i>Lancet</i>. 2007 Mar 17;369(9565):935-45.</p> <p>Citation:</p> <p>2. Genetic studies¹¹ show high heritability of the trait, and segregation analysis suggests the presence of an autosomal codominant major gene conferring susceptibility to podoconiosis.</p> <p>Davey G, Newport M. Podoconiosis: The most neglected tropical disease? <i>Lancet</i>. 2007 Mar 17;369(9565):888-9.</p> <p>Prediction:</p> <p>3. Those likely to be sick will face ever increasing premiums, and voluntary coverage will continue to decline.</p> <p>Luft HS. Universal health care coverage: a potential hybrid solution. <i>JAMA</i>. 2007 Mar 14;297(10):1115-8.</p>
<p>CAN</p>	<p>Possibility: It is possible, but will not happen every time.</p> <p>OR</p> <p>Ability</p>	<p>Possibility:</p> <p>1. Recent studies^{3,4,36-38} have shown that therapeutic hypothermia can result in better outcomes for patients with out-of-hospital ventricular fibrillation.</p> <p>SOS-KANTO study group. Cardiopulmonary resuscitation by bystanders with chest compression only (SOS-KANTO): an observational study. <i>Lancet</i>. 2007 Mar 17;369(9565):920-6.</p> <p>Ability:</p> <p>2. How can we explain the discrepancy between studies of mite avoidance in children that suggest some benefit [6,8,17] and the data from our study and other studies involving adults that show no improvement in asthma control? [5,10,21]</p> <p>Woodcock A, Forster L, Matthews E, Martin J, Letley L, Vickers M, et al. Control of exposure to mite allergen and allergen-impermeable bed covers for adults with asthma. <i>N Engl J Med</i>. 2003 Jul 17;349(3):225-36.</p>

	Description	Examples
SHOULD	<p>Reasonable expectation (more than 50%)</p> <p>OR</p> <p>Stating limitations indirectly (a “recommendation” to oneself)</p> <p>Other Uses:</p> <p>Making recommendations about future studies or clinical treatment</p>	<p>Reasonable expectation:</p> <p>1. D-Dimer is a marker of endogenous fibrinolysis and should therefore be detectable in patients with deep-vein thrombosis.</p> <p>Wells PS, Anderson DR, Rodger M, Forgie M, Kearon C, Dreyer J, et al. Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis. <i>N Engl J Med.</i> 2003 Sep 25;349(13):1227-35.</p> <p>Stating limitations indirectly:</p> <p>2. Potential limitations of our study should be acknowledged.</p> <p>Recommendation about future studies:</p> <p>3. Further analysis of these mice should more clearly define the contribution of SDF1 in this setting and, more globally, to the nonredundant roles for RBP2 demethylase activity in vivo.</p> <p>Klose RJ, Yan Q, Tothova Z, Yamane K, Erdjument-Bromage H, Tempst P, et al. The retinoblastoma binding protein RBP2 is an H3K4 demethylase. <i>Cell.</i> 2007 Mar 9;128(5):889-900.</p> <p>Recommendations about clinical treatment:</p> <p>4. ... the decision to perform ablation should also take into account the risk of a fatal complication.</p> <p>Pappone C, Santinelli V, Manguso F, Augello G, Santinelli O, Vicedomini G, et al. A randomized study of prophylactic catheter ablation in asymptomatic patients with the Wolff-Parkinson-White syndrome. <i>N Engl J Med.</i> 2003 Nov 6;349(19):1803-11.</p> <p>5. Both generalists and medical subspecialists should recommend influenza vaccinations to their elderly and high-risk patients.</p> <p>Nichol KL, Nordin J, Mullooly J, Lask R, Fillbrandt K, Iwane M. Influenza vaccination and reduction in hospitalizations for cardiac disease and stroke among the elderly. <i>N Engl J Med.</i> 2003 Apr 3;348(14):1322-32.</p>
MAY	<p>Possibility (some doubt): Very common for reporting results cautiously.</p>	<p>Possibility:</p> <p>1. The cohort study had a small number of participants, unaccounted crossover between the groups, and large loss to follow-up, which may have affected the validity of the results.</p> <p>Sambunjak D, Straus SE, Marusić A. Mentoring in academic medicine: A systematic review. <i>JAMA.</i> 2006 Sep 6;296(9):1103-15.</p>

	Description	Examples
COULD	<p>Possibility (more doubt): More cautious than CAN</p> <p>Common with “whether”</p> <p>Other Uses: Past tense of CAN</p>	<p>Possibility:</p> <p>1. It is possible that the presence of these mutant p53 proteins in human tumors could negatively affect the outcome of functional p53 restoration depending on how p53 function is restored.</p> <p>Kastan MB. Wild-Type p53: Tumors Can’t Stand It. Cell. 2007 Mar 9;128(5):837-40.</p> <p>With “whether”:</p> <p>2. It remains to be determined whether mutations in <i>MC4R</i> could be one cause of long-term treatment failure.</p> <p>Branson R, Potoczna N, Kral JG, Lentes KU, Hoche MR, Horber FF. Binge eating as a major phenotype of melanocortin 4 receptor gene mutations. N Engl J Med. 2003 Mar 20;348(12):1096-103.</p> <p>Past tense of “can”:</p> <p>3. Patients were contacted by telephone every 7 to 14 days so that investigators could monitor compliance and safety.</p> <p>Rowbotham MC, Twilling L, Davies PS, Reisner L, Taylor K, Mohr D. Oral opioid therapy for chronic peripheral and central neuropathic pain. N Engl J Med. 2003 Mar 27;348(13):1223-32.</p>
MIGHT	<p>Possibility: Same strength as COULD</p>	<p>Possibility:</p> <p>1. Reactive T cells might produce higher levels of interleukin 5, stimulating tissue eosinophilia and subsequent pruritus.</p> <p>Byrd JA, Scherschun L, Chaffins ML, Fivenson DP. Eosinophilic dermatosis of myeloproliferative disease: Characterization of a unique eruption in patients with hematologic disorders. Arch Dermatol. 2001 Oct;137(10):1378-80.</p>

3. Showing Confidence about Ideas: Examples in Context

In the following excerpts from a discussion section, the expressions showing the degree of certainty about an idea are underlined. Note that some are exact statistical statements (e.g. significant), and others are more vague (e.g. nearly all). Also note that the authors tend to use different expressions in each part of the discussion section.

The article tested the benefits of providing children under 4 years old with zinc dietary supplements. The first excerpt comes from the very beginning of the discussion section, where the authors summarize the findings they have already presented in the results section. They use a variety of expressions to show more or less confidence in each idea.

Example:

In our study, zinc supplementation did not result in a significant reduction in overall mortality in children aged 1–48 months in a population with high malaria transmission. However, there was a suggestion that the effect varied by age, with no effect on mortality in infants, and a marginally significant 18% reduction of mortality in children 12–48 months of age ($p=0.045$). This effect was mainly a consequence of fewer deaths from malaria and other infections. Any effect on mortality in this trial was in addition to a possible effect of vitamin A supplementation . . .

The second excerpt suggests several possible interpretations of one result, that zinc supplements did not have a measurable affect on infants less than 1 year old. Note that the authors use “might” and “could” frequently and alternate the two expressions for variety. The discussion is framed at the beginning and end with two other expressions: possible and suggest(ion).

Example:

There are several possible explanations for the absence of effects of zinc supplementation in children younger than 12 months. Infants might have acquired adequate zinc in utero . . . Alternatively, the absence of effect in this age group might be related to the low 5 mg dose used. . . Effects of zinc might be mediated through improvement in immunity . . . and this effect could be restricted in infants . . . [V]ariation in response to zinc supplements in infants in different populations might be expected. Our findings of no effect in infants need further investigation . . . because they could have important implications for targeting of children who would benefit from additional zinc. . . Nutritional and immunological differences might affect responses to infections and survival. . . Thus, the results of this large community-based placebo controlled zinc supplementation trial suggest that . . . zinc supplementation did not have any effect on mortality in infants, but there was a suggestion of reduced mortality in children older than 1 year.

The last section of the discussion offers suggestions for future research. Note the use of “would” in the suggested hypothesis statement. This is a rewritten version of the Yes/No question: “Would a higher dose have a different effect?” As usual, “would” is combined with an implied “if.” “If we did another study, would a higher dose. . .?” For more information on how to write research questions, see the Introductions chapter.

Example:

Feasible and sustainable methods of enhancing the bioavailable intake of dietary zinc need assessment. We also need to know whether a higher dose would have a different effect in infants, and to elucidate the mechanisms of the effects of zinc and any differences between boys and girls. Our results suggest a need for meta-analysis of all available studies both for mortality and morbidity to make evidence based recommendation for public health policy to improve mortality, morbidity, growth, and development.

Sazawal S, Black RE, Ramsan M, Chwya HM, Dutta A, Dhingra U, et al. Effect of zinc supplementation on mortality in children aged 1–48 months: a community-based randomised placebo controlled trial. *Lancet*. 2007 Mar 17;369(9565):927-34.