

## Example Literature Critiques

Paper: Warner, R.R., and Dill, L.M. 2000. Courtship displays and coloration as indicators of safety rather than of male quality: the safety assurance hypothesis. *Behavioral Ecology* 11(4):444-451

Both of these critiques scored 10/10. I have added some marginal notes to highlight strengths (and a few weaknesses).

### Critique 1:

The safety assurance hypothesis (SAH) predicts that during courtship, brightly colored males provide information regarding the safety of the spawning area, rather than the quality of the male. To test this, Warner and Dill (2000) studied the spawning behavior of the bluehead wrasse, *Thalassoma bifasciatum*, since females will either spawn after courtship with a brightly colored male (TP) or without courtship in a large group of duller males (IP). This indicates that females are less concerned with male quality and more concerned with their own survival during spawning events. Warner and Dill (2000) hypothesized that TP males should be more visible to predators than IP males; therefore, TP males should court less intensely since their conspicuousness increases risk of predation. Females would also require less courting from TP males due to its riskiness while IP males must court more intensely. They further hypothesized that in the presence of a predator or threat, courtship overall should decrease to signal the threat to females.

To test the conspicuousness of TP males, Warner and Dill (2000) used 2-D models of TP males that varied in the percent white of the flank patch. The proportion of white on the flank patch was evaluated as past studies showed a positive correlation with higher percent white and female preference and spawning success. The 2-D models had either narrow, medium, or wide patches and were observed by a diver to determine maximum visibility distance. The intensity of courtship was observed and evaluated by defining courtship as continuous fin vibration and the number of spawns was recorded. They then added a threat by placing a preserved lizardfish in a Plexiglas container near a spawning site and monitored behaviors. As a control, an empty Plexiglas container was also placed at other sites. At the end of their study, TP males were captured, measured, and photographed.

Warner and Dill found that there was a positive correlation with conspicuousness of the male (maximum visibility distance) and the percent white on the flank patch. A negative correlation was found between the conspicuousness of the male and the duration of spawning; the more conspicuous, the shorter the duration of courtship. After the introduction of a threat, overall courtship duration decreased; however, after habituation with the threat, males resumed regular courtship and eventually increased their courtship duration. TP males with higher percent white in flank patches increased their courtship less than IP, but were still more successful in spawning than IP males.

Will White 9/8/2015 10:35 AM

**Comment [1]:** Right to the point!

Will White 9/8/2015 10:36 AM

**Comment [2]:** End first paragraph with clear statement of hypotheses

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**Comment [3]:** ...followed by succinct explanation of how they tested hypothesis

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**Comment [4]:** would be nice to be more specific about what behaviors (and by what animals) were being monitored

Will White 9/8/2015 10:37 AM

**Comment [5]:** Clear statement of the results

Females continued to be cautious of the threat since they were only exposed to it upon arrival at the spawning site whereas males stationed themselves at spawning locations.

These observations supported SAH: brightly colored males did not have to increase courtship as much as duller males in the presence of a threat and during initial encounter of the threat, overall courtship decreased. Females also displayed caution and required more courtship from males in presence of the threat.

Since SAH predicts that elaborate males court to convey safety information rather than quality, further studies should test the difference in mating success from less elaborate males. Even though they are less elaborate, they make up for the difference in courting intensity. Warner and Dill (2000) mentioned an alternative hypothesis from Reynolds (1993): the differential-cost hypothesis that predicts that more conspicuous males cannot afford to increase courtship too much under predation as it is too costly. Warner and Dill (2000) also mention that SAH may not be applicable to every species since it can depend on life histories. Bluehead wrasse, for example, are sex changing and iteroparous which means they can afford to be more concerned with survival rather than spawning success.

Reynolds, J.D. 1993. Should attractive individuals court more? Theory and a test. *The American Naturalist* 141(6):914-927

## Critique 2:

In the introduction of "Courtship displays and coloration as indicators of safety rather than of male quality: the safety assurance hypothesis" the authors discuss how in some species courting displays may not indicate the value of the individual male like usual, but rather the displays indicate the safety of the mating site. To test this hypothesis, the researchers observed bluehead wrasses, a Caribbean reef fish, due to the fact that females travel to males territories to mate and males court the arriving females. Their safety assurance hypothesis (SAH) suggests that bright coloration and intense courtship by the males conveys to the females that their territory is the safest for mating. In other words, it is dangerous for brightly colored males to participate in intense courtship displays, so those who do show the females that they are at a low risk for predation.

In order to perform this study, the researchers conducted 17 experiments at two mating sites along the same reef, so that they could observe the relationship between coloration and courtship in a natural setting. The researchers introduced a fake predator into the water at one site to give the illusion of predation threat. Because the males were constantly around the fake predator, they realized that there was no real threat; however, since the females were introduced to the site in small time frames, they always perceived the threat as real. The observer at each site continuously recorded all mating and courtship behaviors, including the initiation and duration of each courtship session.

Will White 9/8/2015 10:38 AM

**Comment [6]:** Link results back to the original hypothesis. Supported or not?

Will White 9/8/2015 10:39 AM

**Comment [7]:** If there were any concerns about results or objections to interpretation, that should be in here someplace.

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**Comment [8]:** Ending up with suggestions for future research.

Will White 9/8/2015 10:43 AM

**Comment [9]:** not necessary to restate the title

Will White 9/8/2015 10:44 AM

**Comment [10]:** right to the point –what is the hypothesis, how was it tested?

Will White 9/8/2015 10:44 AM

**Comment [11]:** too wordy. just say "because"

Will White 9/8/2015 10:44 AM

**Comment [12]:** whose? the wrasses'?

Will White 9/8/2015 10:46 AM

**Comment [13]:** need to explain what the coloration is in this case.

Courtship was determined as continuous fin vibration; if males paused for more than one second, the researcher considered the courtship to be over.

The research results show that there was a clear relationship between the duration of courtship with the percent of coloration. In other words, males with a greater percent of white in their patch tended to court for shorter durations under controlled conditions. The addition of the model predator at the second site initially caused the duration of courtship to be much less than the control group. However, once the males got used to the model predator, courtship duration increased to levels higher than those in the control group. The results show that males with less white coloration courted for longer amounts of time and lengthened their courtships with the addition of the model predator, while bright colored males had shorter courtships and did not respond to the model predator. The model predator did cause a slight decrease in spawning; however, the difference was not statistically significant compared to the site with no predation threat.

In conclusion, the researchers found: that all male wrasses initially courted less in the presence of a predator, and therefore the intensity of courtship is a reliable signal of the safety of the mating site, some males increase their courtship durations in the presence of a predator which suggests that females might require more intense courtship with increased predation risk, and that males that increased courtship duration were already the fish with relatively long courtships already. These findings support the SAH, that some species may use bright coloration and courtship to as indicators of safety rather than of male quality. However, I felt that their results were a little unclear and inconclusive. For example, when they say things such as, "some males increase their courtship durations." What exactly is "some" males? They did not provide a percentage of how many males actually exhibited this behavior. They also state that the males who increased their courtship duration were males with already long periods of courtship, while others did not increase their behavior. So, this seems like an inconclusive result that may or may not show that females require more courting in the presence of a predator. I felt that the researchers developed a good hypothesis and could definitely be explaining how some species use coloration and courtship as indicators of something more than the quality of the male. This could be really important for further research on how species assess costs when choosing a mate. However, I felt that the experiment would need to be conducted again to develop better results and eliminate other possible explanations of the species' behavior in order to more confidently be able to say that safety can be displayed by coloration and courtship duration.

Will White 9/8/2015 10:45 AM

**Comment [14]:** awkward. percent of coloration of what? Also, should be "percentage".

Will White 9/8/2015 10:47 AM

**Comment [15]:** in general, 'do it again' and 'get a bigger sample size' are not legitimate critiques unless you have a more specific suggestion for what could be done differently or what alternative result you would expect to find upon repeating the study.