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Reaction to Shark Chlorine Prevention

Anton Amann*

Department of Analytical Chemistry, Stockholm University, Frescativägen, Sweden

Introduction

The hydrosphere holds all of our waste and mistakes, whether they are sewage, garbage, process-affected waters, runoff, or gases. Moving away from undesirable inputs appears to be an obvious way for fish living in such environments to avoid harm. While this should happen, there are numerous examples of when it does not. The inability to avoid hazardous environments may result in sensory impairments, limiting one's ability to avoid other dangers or locate benefits. The danger must first be perceived for avoidance to occur, which may not occur if the fish is 'blinded' in some way. Second, if the fish is cognitively confused or impaired [1].

The rhythms of life are guided by sensory input. An organism not only locates itself in its surroundings, but also directs physiological and behavioural responses by integrating signals. A proliferation of human sourced sensory inputs adds to and challenges the complexities of such multifaceted interactions. For example, we have over 100,000 synthetic chemicals, the vast majority of which will enter ecosystems worldwide, often in complex mixtures. The question is whether animals can adapt and survive as the sensory linkages that connect life change. The ability to predict sensory responses of animals in altered environments is critical to ensuring the future of our ecosystems. Synthetic chemicals and other human based stimuli may serve as stimuli or affect responses to natural stimuli [2].

In an ideal world, animals would move away from areas of harm and toward areas of benefit in order to put themselves in a better position for survival. The question is whether this is still true today, given that synthetic, toxic chemicals frequently resemble naturally occurring, desirable chemicals. In fact, humans have a history of producing toxic chemicals that are meant to attract rather than repel. Many of these chemicals are either of natural origin or are based on them. Consider the numerous plant derivatives that humans use to alter neurophysiology, including nicotine, caffeine, cocaine, and amphetamines, to name a few. These chemicals have the potential to enter the hydrosphere, and fish can become addicted to neurostimulatory chemicals as well [3].

Description

There will be stimuli that function in the exact opposite way as those mentioned above, i.e. evoke concentration dependent attraction, or evoke low concentration attraction but avoidance to attraction at higher concentration. The first of these curves is self-explanatory: attraction may occur when a stimulus reaches a sufficient concentration and is perceived as desirable. The second curve is more complicated, indicating that a fish avoids the stimulus at low concentrations but prefers it at higher concentrations. This biphasic response is unusual, but it has been observed for rainbow trout and copper at least once.

***Address for Correspondence:** Anton Amann, Department of Analytical Chemistry, Stockholm University, Frescativägen, Sweden, E-mail: antonamann@gmail.com*

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While the majority of fish avoid, there is a chance that the minority will do the exact opposite. This was observed in Lake Whitefish given the opportunity to avoid various cadmium concentrations; avoidance or preference was determined by the individual. Polar opposites have been observed in larval fish. When exposed to an aversive stimulus, some active zebra fish became inactive, some inactive fish became active, and some fish did not respond. To summarise, safeguarding all 'personalities' will not always be possible. We can assume that fish drawn to a harmful contaminant are less likely to survive than fish drawn away from it. The consequences for fish populations living in or near chemical inputs may be the loss of genetic variation underpinning certain phenotypes [4].

There are numerous instances where avoidance is learned. Among these, the response of salmonids to specific amino acids released from mammalian skin is one of the most commonly used in fish sensory work. Salmon are thought to learn to associate a conditioned stimulus with an aversive, unconditioned stimulus, such as the smell of conspecific death. Others include examples of aversive conditioning laboratory studies. There should be no expectation that some of our toxic inputs will cause harm to fish. Indeed, it is easier to argue that fish associate 'new,' toxic stimuli with benefit.

In general, EDC and sensory (particularly olfaction) interactions are understudied but have enormous potential to be interesting, in part because there is every expectation that EDC exposure during development will cause persistent changes in receptor expression (as has been demonstrated for mice exposed in utero to biphenyl A, which modulated brain oestrogen receptor number). Such modifications could alter avoidance by modifying sensory input or the processing side of responses. For EDCs that exist in an environmental gradient, a question about potential avoidance and avoidance testing can be posed. In addition to EDCs, copper exposure during development impaired fathead minnows' ability to avoid alarm cues [5].

Conclusion

This review provides numerous examples of fish moving in response to negative stimuli. The majority of the responses are, as expected, aversive; however, these responses are typically to chemicals that fish have evolved to recognise as harmful. Using synthetic Chemical reactions are easier to predict than behavioural responses. Attraction responses, as well as no responses, are common in synthetic chemicals and their mixtures. Many of our drugs will be introduced to some fish throughout their lives. We can't expect them to make the "right" decisions.

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Conflict of Interest

There is no conflict of interest by author.

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