Awareness, Cognitive Ability and Fear

Web Resources

Bisazza A, De Santi A, Vallortigara G (1999). **Laterality and cooperation: mosquitofish move closer to a predator when the companion is on their left side.** *Animal Behaviour*. 57:1145-1149
NAL Call No. 410 B77
Descriptors: mosquitofish, laterality, awareness, behavior, *Gambusia holbroki*

Bisazza A, Pignatti R, Vallortigara G (1997) **Detour tests reveal task- and stimulus-specific behavioural lateralization in mosquitofish (*Gambusia holbrooki*).** *Behavioural Brain Research*. 89:237-242
Descriptors: mosquitofish, laterality, awareness, behavior, *Gambusia holbroki*

Bisazza A, Rogers LJ, Vallortigara G (1998) **Origins of cerebral asymmetry: a review of evidence of behavioural and brain lateralization in fishes, reptiles and amphibians.** *Neuroscience and Biobehavioural Reviews.* 22:411-426
NAL Call No. QL750 B5
Descriptors: brain lateralization, awareness, behavior, fishes

Bunge M, Ardila R (1987) *Philosophy of Psychology***.** Springer-Verlag, New York
Descriptors: brain lateralization, awareness, behavior, fishes

Canfield JG, Rose GJ (1993) **Activation of Mauthner neurons during prey capture.** *Journal of Comparative Physiology A.* 172:611-618
NAL Call No. 444.8 Z3
Descriptors: Mauthner neurons, prey capture, awareness, behavior, fishes

Cantalupo C, Bisazza A, Vallortigara G (1995) **Lateralization of predator-evasion response in a teleost fish (*Girardinus falcatus*).** *Neuropsychologia.* 33:1637-1646
Descriptors: mosquitofish, laterality, awareness, behavior, teleost, *Girardinus falcatus*

Cornish IME, Moon TW (1986) **The glucose and lactate kinetics of American eels, *Anguilla rostrata* (LeSueur), under MS 222 anaesthesia.** *Journal of Fish Biology.* 28 (1):1-8

NAL Call No. QL614 J68
Glucose and lactate kinetics were examined in fed and food-deprived American eels, *Anguilla rostrata* , under MS 222 anaesthesia (AE). These values are compared to free-swimming, non-anaesthetized animals (FSE) reported previously (Cornish & Moon, 1985). The AE group demonstrated a steady but minor hyperglycemia during the 5-h experiment and significant decreases in both glucose turnover and metabolic clearance rates compared to the FSE groups. Food-deprivation further depressed these kinetic parameters. Blood lactate continuously increased during the experiment, reaching values 300 times (fed) and 100 times (food-deprived) higher than the similar FSE groups. Rates of lactate appearance in and disappearance from the blood generally increased with anaesthesia. This study supports the view of Soivio et al. (1977) that MS 222 acts as an asphyxiant.
Descriptors: fish physiology, kinetics, glucose, anesthesia, animal metabolism, *Anguilla rostrata* , lactate, hyperglycemia

Csanyi V (1986) **Ethological analysis of predator avoidance by the paradise fish (*Macropodus opercularis* L.): II. Key stimuli in avoidance learning.** *Animal Learning & Behavior*. 14:101-109
NAL Call No. QL785 A725
Descriptors: ethology, awareness, behavior, learning, paradise fish, *Macropodus opercularis*

Csányi V (1993) **How genetics and learning make a fish an individual: a case study on the paradise fish.** In: *Perspectives in Ethology. Volume 10; Behavior and Evolution* (ed. by P.P.G. Bateson, P.H. Klopher & N.S. Thompson), pp. 1-51. Plenum Press, New York
NAL Call No. QL751 P4
Descriptors: ethology, genetics, awareness, behavior, learning, paradise fish, *Macropodus opercularis*

Csányi V, Csizmadia G, Miklosi A (1989) **Long-term memory and recognition of another species in the paradise fish.** *Animal Behaviour*. 37:908-911
NAL Call No. 410 B77
Descriptors: ethology, awareness, behavior, learning, memory, recognition, paradise fish, *Macropodus opercularis*

Csányi V, Dóka A (1993) **Learning interactions between prey and predator fish**. *Marine and Freshwater Behaviour and Physiology.* 23:63-78
Descriptors: ethology, awareness, behavior, learning, predator-prey relationship

Csànyi V, Lovàsz F (1987) **Key stimuli and the recognition of the physical**

environment by the paradise fish *Macropodus opercularis*. *Animal Learning & Behavior*. 15:379-381
NAL Call No. QL785 A725
Descriptors: ethology, awareness, behavior, environment, recognition, paradise fish, *Macropodus opercularis*

Davis RE, Klinger PD (1994) **NMDA receptor antagonist MK-801 blocks learning of conditioned stimulus-unconditioned stimulus contiguity but no fear of conditioned stimulus in goldfish (*Carassius auratus* L.).** *Behavioral Neuroscience.* 108:935-940
NAL Call No. QP351 B45
Descriptors: ethology, awareness, behavior, goldfish, *Carassius auratus*, MK-801

Dugatkin LA, Wilson DS (1994) **Choice experiments and cognition: A reply to Lamprecht and Hofer.** *Animal Behaviour.* 47(6):1459-1461
NAL Call No. 410 B77
Lamprecht & Hofer (1994) raise three criticisms of our study of bluegill cognitive abilities (Dugatkin & Wilson 1992), which are outlined as follows.
Descriptors: Lepomis macrochirus, cognitive ability, cooperativity, freshwater fish, intraspecific relationships, learning behavior, cooperation

Eaton RC, Lavender WA, Wieland CM (1981) **Identification of Mauthner-initiated response in goldfish: evidence from simultaneous cinematography and electrophysiology**. *Journal of Comparative Physiology* 144:521-531
NAL Call No. 444.8 Z3
Descriptors: ethology, awareness, behavior, goldfish, *Carassius auratus*

Eaton RC, Lavender WA, Wieland CM (1982) **Alternative neural pathways initiate fast-start responses following lesions of the Mauthner neuron in goldfish**. *Journal of Comparative Physiology* 145:485-496
NAL Call No. 444.8 Z3
Descriptors: ethology, awareness, behavior, goldfish, neurobiology, Mauthner neuron

Eaton RC, Nissanov J (1985) **A review of Mauthner-initiated escape behaviour and its possible role in hatching in the immature zebrafish, *Brachydanio rerio***. *Environmental Biology of Fishes.* 12:265-279
NAL Call No. QL614 E56
Descriptors: ethology, awareness, behavior, zebrafish, *Danio rerio*, *Brachydanio rerio*, neurobiology, Mauthner neuron

Facchin L, Bisazza A, Vallortigara G (1999) **What causes lateralization of detour behavior in fish? evidence for asymmetries in eye use.** *Behavioural Brain Research*. 103:229-234
Descriptors: ethology, behavior, lateralization, eye

Gerlai R, Csanyi V (1994) **Artificial bidirectional selection for a species-specific behavioural element, staccato movement, in paradise fish, Macropodus opercularis.** *Animal Behaviour*. 48(6):1293-1300
NAL Call No. 410 B77
The possibility that phenotypical correlations between staccato movement (an element of fear response in novel situations) and several other behavioural elements of paradise fish have a genetic component has not been investigated previously. The difficulty in determining the genetic underpinnings of staccato movement has been due to violation of the criteria of additive-dominance genetic models of applied-classical and diallel-cross analyses. Furthermore, the limited number of available inbred strains in these cross systems could decrease the number of variable loci and thus one's ability to detect possible genetic effects including genetic covariation. To circumvent these problems, bidirectional selection using a genetically variable outbred population was carried out by recording the behaviour elements in a novel situation, and based on staccato performance, breeding two high-performer and two low-performer lines and a non-selected control population. The response to selection was immediate and strong in the first selected generation in both directions without significant change in the succeeding generations, suggesting a major gene effect in the inheritance of staccato movement. Phenotypical correlations were confirmed between staccato and several other elements. However, correlated response to selection was observed only in one behavioural element (swim), suggesting a genetic component in the swim-staccato phenotypical correlation due either to pleiotropic gene effects or to genetic linkage. The other significant phenotypical correlations between staccato and the behavioural elements, which were non-genetic in origin, also represent a stable correlation structure, which is interpreted to be the result of higher neural mechanisms.
Descriptors: fear, *Macropodus opercularis*, environmental effects, behavioral genetics, outbreeding, flight behaviour, genetics, marine fish, ethology, staccato movement, outbreeding

Hall D, Suboski D (1995) **Visual and olfactory stimuli in learned release of alarm reactions by zebra danio fish (*Brachydanio rerio*).** *Neurobiology of Learning and Memory.* 63:229-240
NAL Call No. QH301 C63
Descriptors: ethology, awareness, behavior, zebrafish, *Danio rerio, Brachydanio rerio,* neurobiology, visual stimuli, olfactory stimuli

Harper DG, Blake RW (1990) **Fast-start performance of rainbow trout *Salmo gairdneri* and Northern pike *Esox Lucius*.** *Journal of Experimental Biology.* 150:321-342

NAL Call No. 442.8 B77
Descriptors: ethology, awareness, performance, behavior, rainbow trout, Northern pike, *Salmo gairdneri, Esox Lucius*

Höglund E, Balm PH, Winberg S (2000) **Skin darkening, a potential social signal in subordinate Arctic charr (*Salvelinus alpinus*): the regulatory role of brain monoamines and pro-opiomelanocortin-derived peptides.** *Journal of Experimental Biology.* 203:1711-1721
NAL Call No. 442.8 B77
Descriptors: ethology, skin pigmentation, behavior, neurobiology, monoamines, pro-opiomelanocortin-derived peptides, Arctic char, *Salvelinus alpinus*

Höjesjö J, Johnsson JI, Axelsson M (1999) **Behavioural and heart rate responses to food limitation and predation risk: an experimental study on rainbow trout.** *Journal of Fish Biology*. 55:1009-1019
NAL Call No. QL614 J68
Descriptors: ethology, behaviour, rainbow trout, *Oncorhynchus mykiss*

Johnsson JI (1997) **Individual recognition affects aggression and dominance relations in rainbow trout, *Oncorhynchus mykiss***. *Ethology.* 103:267-282
NAL Call No. QL750 E74
Descriptors: ethology, behaviour, awareness, rainbow trout, *Oncorhynchus mykiss*

Johnsson JI, Åkerman A (1998) **Watch and learn: preview of the fighting ability of opponents alter contest behaviour in rainbow trout**. *Animal Behaviour*. 56:771-776
NAL Call No. 410 B77
Descriptors: ethology, behaviour, awareness, rainbow trout, *Oncorhynchus mykiss*

Jones RB (1997) **Fear and distress.** In: *Animal Welfare* (ed. by MC Appleby & BO Hughes), pp. 75-87. CAB International. University Press, Cambridge
NAL Call No. HV4711 A587 1997
Descriptors: ethology, behaviour, awareness, fish, cognition

Lachlan RF, Crooks L, Laland KN (1998) **Who follows whom? Shoaling preferences and social learning of foraging information in guppies**. *Animal Behaviour*. 56:181-190
NAL Call No. 410 B77
Descriptors: ethology, behaviour, awareness, shoaling, guppies

Lamprecht J, Hofer H (1994) **Cooperation among sunfish: Do they have the cognitive abilities?** *Animal Behaviour.* 47(6):1457-1458 ISSN: 0003-3472
NAL Call No. 410 B77

Dugatkin & Wilson (1992) set out to test a common assumption in game theory models of cooperation, namely that animals can remember the outcome of previous interactions with particular individuals and behave with reference to that outcome in future interactions. They concluded that their experiments demonstrated such cognitive abilities in bluegill sunfish, *Lepomis macrochirus*. In this note we ask whether their experiments and results provide unambiguous support for this conclusion and suggest that this is not the case.
Descriptors: Lepomis macrochirus, cognitive ability, cooperativity, learning behavior, freshwater fish, cooperation, intraspecific relationships

Lankford TE Jr, Targett TE (2001) **Physiological Performance of Young-of-the-Year Atlantic Croakers from Different Atlantic Coast Estuaries: Implications for Stock Structure.** *Transactions of the American Fisheries Society.* 130(3): 367-375
NAL Call No. 414.9 AM3
Geographic variation in life history traits and population dynamics of Atlantic croakers Micropogonias undulatus found north of Cape Hatteras, North Carolina, suggests the possibility of two stocks along the U.S. Atlantic coast. The basis for this variation (i.e., genetic versus ecophenotypic) is unclear. Young-of-the-year Atlantic croakers were collected from three Atlantic coast estuaries (Delaware Bay, Delaware, Cape Fear River, North Carolina, and Indian River Lagoon, Florida) that represent the center and extreme distributional limits of the species' U.S. Atlantic coast range. Intrinsic growth capacity and cold tolerance were measured under common laboratory conditions to test for adaptive genetic variation in these traits. Results were used to evaluate the two stock hypothesis for the Atlantic croaker and to examine the integrity of Cape Hatteras as a possible genetic stock boundary. Growth capacity, feeding rate, growth efficiency, and cold tolerance were similar across geographic locations. Survival curves for Delaware and Florida Atlantic croakers were indistinguishable at each of four low temperatures tested (1, 3, 5, and 7°C), with neither group capable of surviving temperatures of 3°C or less. The suggested lack of adaptive variation we found in these physiological traits supports the hypothesis of a single genetic stock of Atlantic croakers along the Atlantic coast. Although severe winter temperatures may select for fast growth and cold-tolerant genotypes in Northern estuaries, gene flow is apparently sufficient to preclude local genetic adaptation.
Descriptors: estuaries, fish physiology, condition factor, population dynamics, life history, growth, geographical distribution, population genetics, stock identification, biogeography, stock assessment, *Micropogonias undulatus*, ANW, USA, Delaware Bay, ANW, USA, North Carolina, Cape Fear Estuary, ASW, USA, Florida, Indian River Lagoon, USA, Delaware Bay, USA, North Carolina, USA, Florida, Atlantic croaker

Lombardi CM, Hurlbert SH (1996) **Sunfish cognition and pseudoreplication.** *Animal Behaviour.* 52(2):419-422 ISSN: 0003-3472

NAL Call No. 410 B77
In a recent study Dugatkin & Wilson (1992) tested for cognitive abilities in bluegill sunfish. They found that when a focal fish was allowed to forage with different companions, it was able to remember with which ones it had had greatest success and to use this information in future interactions. Moreover, fish seemed to prefer to associate with familiar conspecifics over unfamiliar ones. A number of subsidiary analyses were also reported.
Descriptors: cognitive ability, learning behaviour, freshwater fish, experimental research, *Lepomis macrochirus*, pseudo replication, statistical analysis

López CJ, Broglio C, Rodríguez F, Thinus-Blanc C, Salas C (2000) **Reversal learning deficit in a spatial task but not in a cued one after telencephalic ablation in goldfish**. *Behavioural Brain Research*. 109:91-98
Descriptors: ethology, awareness, behavior, ablation, goldfish, *Carassius auratus*

López JC, Bingman VP, Rodríguez F, Gómez Y, Salas C (2000) **Dissociation of place and cue learning by telencephalic ablation in goldfish**. *Behavioral Neuroscience.* 114:687-699
NAL Call No. QP351 B45
Descriptors: ethology, awareness, behavior, ablation, goldfish, *Carassius auratus*

Losey Jr GS, Margules L (1974) **Cleaning symbiosis provides a positive reinforcer for fish**. *Science*. 184:179-180
NAL Call No. 470 Sci2
Descriptors: ethology, awareness, behavior, positive reinforcement

Mendl M (1999) **Performing under pressure: stress and cognitive function**. *Applied Animal Behaviour Science.* 65:221-244
NAL Call No. QL750 A6
Descriptors: ethology, awareness, behavior, cognition, stress

Metcalfe NB, Taylor AC, Thorpe JE (1995) **Metabolic rate, social status and life-history strategies in Atlantic salmon.** *Animal Behaviour*. 49:431-436
NAL Call No. 410 B77
Descriptors: ethology, awareness, behavior, physiology, *Atlantic Salmon, Salmo salar*

Miklósi Á, Andrew R J (1999) **Right eye use associated with decision to bite in zebrafish**. *Behavioural Brain Research.* 105:199-205
Descriptors: ethology, awareness, behavior, zebrafish, *Danio rerio, Brachydanio rerio,* eye

Nesse RM (2000) **Is depression an adaptation?** *Archives of General Psychiatry.* 57:14-

20
Descriptors: ethology, neurobiology, depression, behavior

O'Connor KI, Metcalfe NB, Taylor AC (1999) **Does darkening signal submission in territorial contests between juvenile Atlantic salmon, *Salmo salar*?** *Animal Behaviour*. 58:1269-1276
NAL Call No. 410 B77
Descriptors: ethology, awareness, behavior, physiology, Atlantic salmon, *Salmo salar*

O'Connor KI, Metcalfe NB, Taylor AC (2000) **Familiarity influences body darkening in territorial disputes between junvenile salmon.** *Animal Behaviour*. 59:1095-1101
NAL Call No. 410 B77
Descriptors: ethology, awareness, behavior, physiology, skin pigmentation, salmon, Salmo

Olla BL, Davis MW (1989) **The role of learning and stress in predator avoidance of hatchery-reared coho salmon (*oncorhynchus kisutch*) juveniles.** *Aquaculture*. 76:209-214
NAL Call No. SH1 A6
Descriptors: ethology, awareness, behavior, physiology, stress, coho salmon, *Oncoryhnchus kisutch*

Øverli Ø, Harris CA, Winberg S (1999) **Short-term effects of fights for social dominance and the establishment of dominant-subordinate relationships on brain monoamines and cortisol in raibow trout.** *Brain, Behaviour and Evolution.* 54:263-275
Descriptors: ethology, behavior, neurobiology, monoamines, cortisol, rainbow trout, *Oncorhynchus mykiss*

Øverli Ø, Winberg S, Damsgård B, Jobling M (1998) **Food intake and spotaneous swimming activity in Arctic char (*Salvelinus alpinus*): role of brain serotonergic activity and social interactions**. *Canadian Journal of Zoology*. 76:1366-1370
NAL Call No. 470 C16D
Descriptors: ethology, behaviour, neurobiology, serotonin, Arctic char, *Salvelinus alpinus*

Pitcher TJ (1993) *Behaviour of Teleost Fishes*, 2nd edition. Chapman & Hall, London
NAL Call No. QL639.3 B44 1993
Descriptors: ethology, behaviour, neurobiology, physiology, awareness, teleost

Popper AN, Carlson TJ (1998) **Application of sound and other stimuli to control fish behavior**. *Transactions of the American Fisheries Society*. 127:673-707
NAL Call No. 414.9 Am3
Descriptors: ethology, behaviour, neurobiology

Schaerer S, Kirschfeld K (2000) **The role of background movement in goldfish vision.** *Journal of Comparative Physiology A.* 186:583-593
NAL Call No. 444.8 Z3
Descriptors: ethology, behaviour, opthamology, neurobiology, goldfish

Schreck CB, Jonsson L, Feist G, Reno P (1995) **Conditioning improves performance of juvenile chinook salmon, *Oncorhynchus tshawytscha*, to transportation stress**. *Aquaculture*. 135:9-110
NAL Call No. SH1 A6
Descriptors: ethology, transport, stress, conditioning, behaviour, Chinook salmon, *Oncorhynchus tshawytscha*

Topál J, Csányi V (1999) **Interactive learning in the paradise fish (*Macopodus opercularis*): an ethological interpretation of the second-order conditioning paradigm**. *Animal Cognition.* 2:97-206
Descriptors: ethology, learning, behaviour, second-order conditioning, paradise fish, *Macopodus opercularis*

Vallortigara G, Rogers LJ, Bisazza A (1999) **Possible evolutionary origins of cognitive brain lateralization.** *Brain Research Reviews*. 30:164-175
Descriptors: cognition, evolution, lateralization, fish

Varner GE (1998) *In Nature's Interests? Interests, Animal Rights, and Environmental Ethics***.** Envronmental Ethics and Science Policy Series, Oxford University Press, U.S.A.
NAL Call No. GE42 V38 1998
Descriptors: environmental ethics, animal rights, environmentalists, attitude, philosophy of nature

Wainwright PC (1986) **Motor correlates of learning behaviour: feeding on novel prey by pumpkinseed sunfish (*Lepomis gibbosus*).** *Journal of Experimental Biology.* 126:237-247
NAL Call No. 442.8 B77
Descriptors: ethology, behaviour, learning, feeding behaviour, pumpkinseed sunfish, *Lepomis gibbosus*

Webb PW (1986) **Effect of body form and response threshold on the vulnerability of four species of teleost prey attacked by largemouth bass (*Micropterus salmoides*)**. *Canadian Journal of Fisheries and Aquatic Sciences.* 43:763-771
NAL Call No: 442.9 C16J
Descriptors: ethology, behaviour, neurobiology, predator-prey relationship, teleost,

largemouth bass, *Micropterus salmoides*

Wood-Gush DGM., Dawkins MS, Ewbank R (1981) *Self-Awareness in Domesticated Animals*. Universities Federation for Animal Welfare. Potters Bar, England.
NAL Call No. QL785 S44 1980
Descriptors: psychology, cognition, ethology, comparative

Zayan R (1991) **The specificity of social stress**. *Behavioural Processes*. 25:81-93
NAL Call No. QL750 B4
Descriptors: ethology, behaviour, stress, physiology, neurobiology

Web Resources:

Aspects of Animal Welfare and Aquaculture - A Compendium of Selected Literature by Richard D. Moccia and Kristopher P. Chandroo; Aquaculture Centre, University of Guelph, Guelph, Ontario, Canada
http://www.aps.uoguelph.ca/~aquacentre/aec/publications/welfare-bib.html

Return to: Contents