Recursion Schemes

folds (tear down a structure)
algebra f a → Fix f → a   ↔   *coalgebra f a → a → Fix f*
unfolds (build up a structure)

generalized $(f\ w \to w\ f) \to (f\ (w\ α) \to β)$	**cata**morphism $f\ a \to a$	**ana**morphism $a \to f\ a$	**g**eneralized $(m\ f \to f\ m) \to (α \to f\ (m\ β))$
	prepromorphism* … after applying a NatTrans $(f\ a \to a) \to (f \to f)$	**postpro**morphism* … before applying a NatTrans $(a \to f\ a) \to (f \to f)$	
	paramorphism* … with primitive recursion $f\ (Fix\ f × a) \to a$	**apo**morphism* … returning a branch or single level $a \to f\ (Fix\ f ∨ a)$	
	zygomorphism* … with a helper function $(f\ b \to b) \to (f\ (b × a) \to a)$	**g apo**morphism $(b \to f\ b) \to (a \to f\ (b ∨ a))$	
g histomorphism $(f\ h \to h\ f) \to (f\ (w\ a) \to a)$	**histo**morphism … with prev. answers it has given $f\ (Cofree\ f\ a) \to a$	**futu**morphism … multiple levels at a time $a \to f\ (Free\ f\ a)$	**g futu**morphism $(h\ f \to f\ h) \to (a \to f\ (m\ a))$

refolds (build up then tear down a structure)
algebra g b → (f → g) → coalgebra f a → a → b

	hylomorphism cata; ana		**g**eneralized apply the generalizations for both the relevant fold and unfold
dynamorphism histo; ana		**codyna**morphism cata; futu	
	chronomorphism histo; futu		
Elgot algebra … may short-circuit while building cata; $a \to b ∨ f\ a$		**coElgot** algebra … may short-circuit while tearing $a × g\ b \to b$; ana	

others

synchromorphism

???

exomorphism

???

mutumorphism
… can refer to each other's results
$(f\ (a × b) \to a) \to (f\ (a × b) \to b)$

reunfolds (tear down then build up a structure)
coalgebra g b → (a → b) → algebra f a → Fix f → Fix g

| **meta**morphism ana; cata | **g**eneralized apply … both … [un]fold |

These can be combined in various ways. For example, a "zygohistomorphic prepromorphism" combines the zygo, histo, and prepro aspects into a signature like *(f b → b) → (f → f) → (f (w (b × a)) → a) → Fix f → a*