

# Supplementary Material to

## Systemic resilience in humans and other animals

### Scheffer et al.

Table 1. Examples of critical transitions between alternative states in elements of the human organism

This is a compilation of chronic dynamical diseases characterized by acute and reversible transitions between a preferable state with no or few symptoms, and an alternative state of increased disease activity. (From Olde Rikkert MGM, *et al.* (2016) Slowing Down of Recovery as Generic Risk Marker for Acute Severity Transitions in Chronic Diseases. *Critical Care Medicine* 44(3):601-606.)

System	Disease	Transitional state
Chronic diseases with irregular attacks or exacerbations alternating with periods without symptoms		
Brain (neurologic disease)	Epilepsy	Seizures (various types)
	Migraine	Migraine attack
	Cluster headache	Cluster headache attack
	Narcolepsy	Sleep attacks
	Trigeminal neuralgia	Attacks of facial pain
Brain (psychiatric diseases)	Bipolar mood disorder 'Rapid cyclers'	Depressed or manic episode
Nerve-Muscle	Periodic paralysis	Systemic paralysis
Heart	Paroxysmal atrial fibrillation	Atrial fibrillation state
	Long QT syndrome	Torsade de Pointes
Chronic diseases with exacerbations and episodes with limited symptoms		
Brain (neurologic disease)	Multiple sclerosis	Relapse (sometimes reversible)
Brain (psychiatric diseases)	Schizophrenia	Psychotic episode
	Major depression	Depressed state
Renal system	Chronic renal failure	Fluid volume disturbances
Cardiovascular system	Heart failure	Acute cardiac decompensation
	Chronic autonomic failure	Syncope
Lungs	Asthma	Asthma Attack, COPD exacerbation

	Chronic Obstructive Pulmonary Disease Sleep apnea syndrome Cheyne-Stokes respiration	Apnea episode Cheyne stokes breathing
Hematologic system	Periodic chronic myeloid leukemia	Periodic leukocytosis
Immune system	Familial Mediterranean Fever	Fever episode
Gastro-intestinal system	Crohn's disease Ulcerative colitis Irritable Bowel Syndrome	Relapse of inflammation Relapse of inflammation Attacks of abdominal pain

Table 2. Examples of evidence for critical slowing before in physiological transitions

Slowing down of recovery rate and its indicators, increased variance and increased autocorrelation as detected in experimental and empirical data.

Field	Indicator	Transition	Refs.
<b>Physiology</b>	Recovery rate	Human coordinated motion	(1, 2)
	Recovery rate	Neural firing	(3)
	Recovery rate	Blood pressure	(4-6)
<b>Mood</b>	Temporal correlation	Clinical depression	(7-10)
<b>Epilepsy</b>	Correlation	Seizures	(11)
	Variance	Seizures	(12)
	Recovery rate	Seizures	(13)
<b>Migraine</b>	Recovery rate	Cortical spreading depression	(14-16)

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