

Cronobiologia e atenção

**CAPACIDADE DE APRENDER E FUNÇÕES
METABÓLICAS MAIS AMPLAS**



Carolina Moraes Barros
Felippe Ribeiro Araújo
Maria Carolina Locatelli
Rubia Heloisa Vanderlinde
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INTRODUÇÃO AO TEMA

CRONOTIPOS

Termo que se refere à fase circadiana individual do comportamento humano temporal (Levandovski, 2013)

Diferenças individuais na "hora de dormir" e preferências por períodos do dia – tipos manhã ou noite (Adan et al., 2012)



divergência de autores:
metabolismo em geral ou
rotina do sono

O QUE ESSE TERMO INFERE?



IMPORTÂNCIA DO ESTUDO INDIVIDUAL

- Cronotipo está ligado à personalidade, baseado em estudos feitos com diferentes inventários de personalidade (Randler et al, 2017)
- Idade é uma variável que influencia o cronotipo (Adan et al., 2012; Duarte et al., 2014)
- **Performanece noturna neurocomportamental varia muito entre indivíduos, sendo que somente alguns demonstram ser afetados pela perda de sono (Frey et al., 2004; Leproult et al., 2003; Philip et al., 2004; Van Dongen et al., 2004a,b)**



ligada à necessidade
individual de sono



EFEITOS METABÓLICOS ALÉM DO SONO

Biologic rhythms in clinical and laboratory medicine / Y. Touitou, E.Haus (eds.). 1992, 1st ed. cap VI.

Table 2. Cyclic variation in athletic performance and in selected physiological variables that contribute to athletic performance; peak time estimates are given for each of the variables (comprehensive review in Winget et al. 1985)

Variable	Peak time estimate (hours)
Performance	
Vigilance	1900
Cognition	1800
Manual dexterity	1600
Neuromuscular coordination	1500
Athletic performance	
Swimming	2200
Running	1900
Shot put	1700
Rowing	1700
Physiological	
Cortisol (plasma)	0700
Epinephrine (plasma)	1300
Heart rate	1800
Body temperature	1600
Sweat rate	1300
Respiration rate	1400
Heat production	1500



ATENÇÃO:

Conceito-chave básico
da cognição que
modula a performance

Formado de 4
componentes



afetadas por mudanças
no ciclo circadiano e no
tempo acordado

(Valdez et al, 2010)

ALERTA FÁSICO

Capacidade de responder a um estímulo
depois de um sinal de alerta

ALERTA TÔNICO

Capacidade de responder ao ambiente a
qualquer momento

ATENÇÃO SELETIVA

Capacidade de responder a um estímulo alvo
na presença de distrações

ATENÇÃO SUSTENTADA

Capacidade de responder ao ambiente de
forma eficiente por longos períodos de tempo

CRONOBIOLOGIA E PERFORMANCE MENTAL

TAREFAS COM PERFORMANCE ASSOCIADA A RITMOS CIRCADIANOS

- Sensoriais
- Motoras
- Tempo de Reação
- Memória
- Compreensão de Leitura
- Cálculos Aritméticos
- Velocidade de Processamento
- Mudança de Atividade
- Estimação de Tempo

(Valdez et al, 2010)

VARIAÇÃO DO DESEMPENHO



Aumenta durante o dia
Piora durante a noite



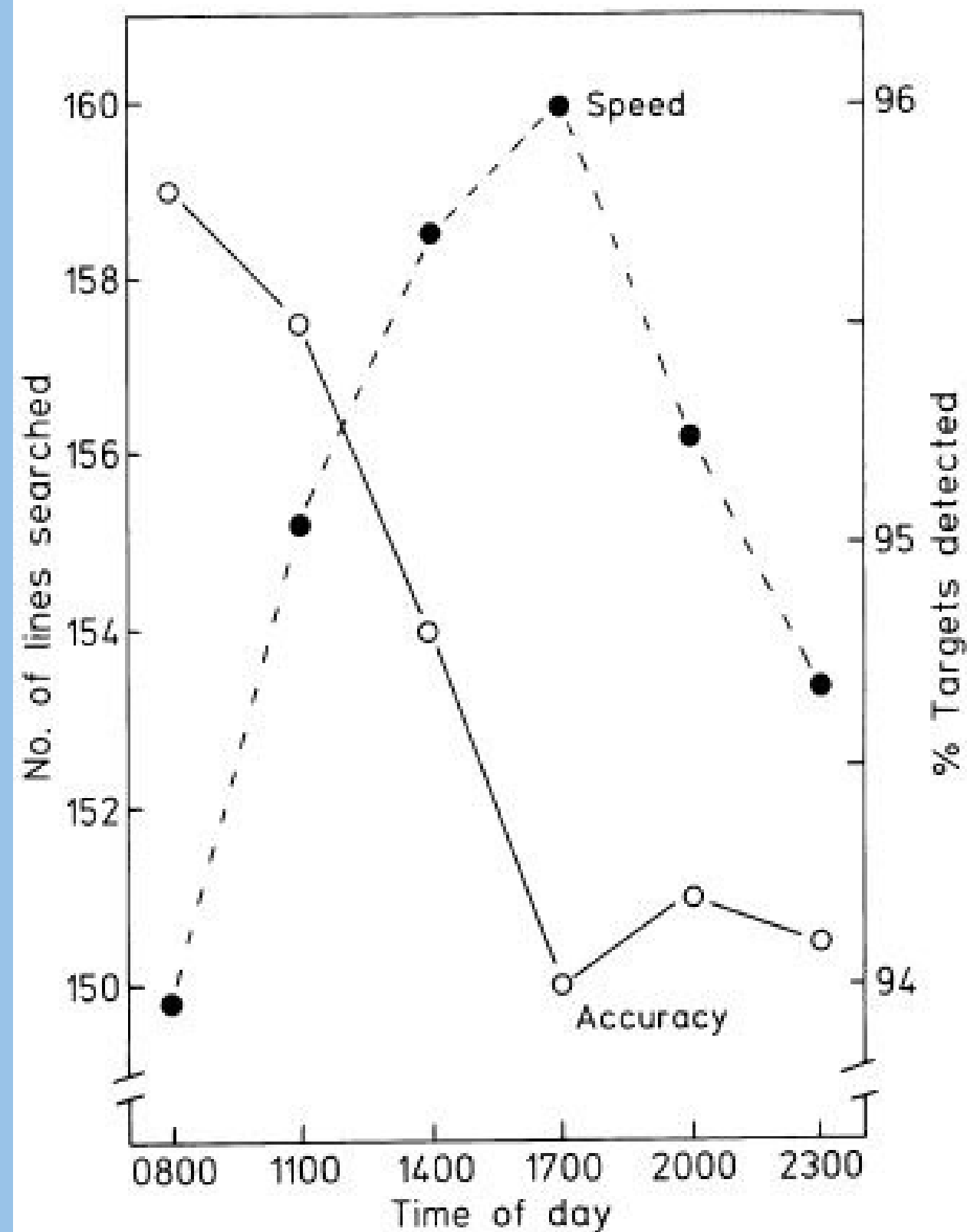


Fig.4. Time of day effects in the speed and accuracy with which a serial search task was performed ($N = 36$). (After Monk and Leng 1982)

Biologic rhythms in clinical and laboratory medicine / Y. Touitou, E.Haus (eds.). 1992, 1st ed. cap VI.



Nocturnal sustained attention during sleep deprivation can be predicted by specific periods of subjective daytime alertness in normal young humans

JACQUES TAILLARD^{1, 2}, NICHOLAS MOORE³, BRUNO CLAUSTRAT⁴,
OLIVIER COSTE², BERNARD BIOULAC^{1, 2} and PIERRE PHILIP^{1, 2}

¹CNRS UMR5543, Université Victor Segalen Bordeaux 2, ²Clinique du sommeil, CHU de Bordeaux, ³INSERM U657, Département de Pharmacologie, Université Victor Segalen-Bordeaux 2, CHU de Bordeaux, Bordeaux and ⁴Service de Radiopharmacie, Hôpital Neuro-cardiologique, Lyon cedex 03, France

Taillard 2006 - Journal of sleep research -15(1);41-45.

OBJETIVO

determinar qual variável seria mais informativa para perda gradual de performance no período noturno entre tipo-manhã e tipo-noite

MÉTODO

18 homens saudáveis (21.4 ± 1.9 anos), 9 de cada tipo mantidos acordados por 36h numa cama, em protocolo de rotina foram sincronizados por 1 semana antes do estudo analisaram médias de lapsos noturnos e diurnos

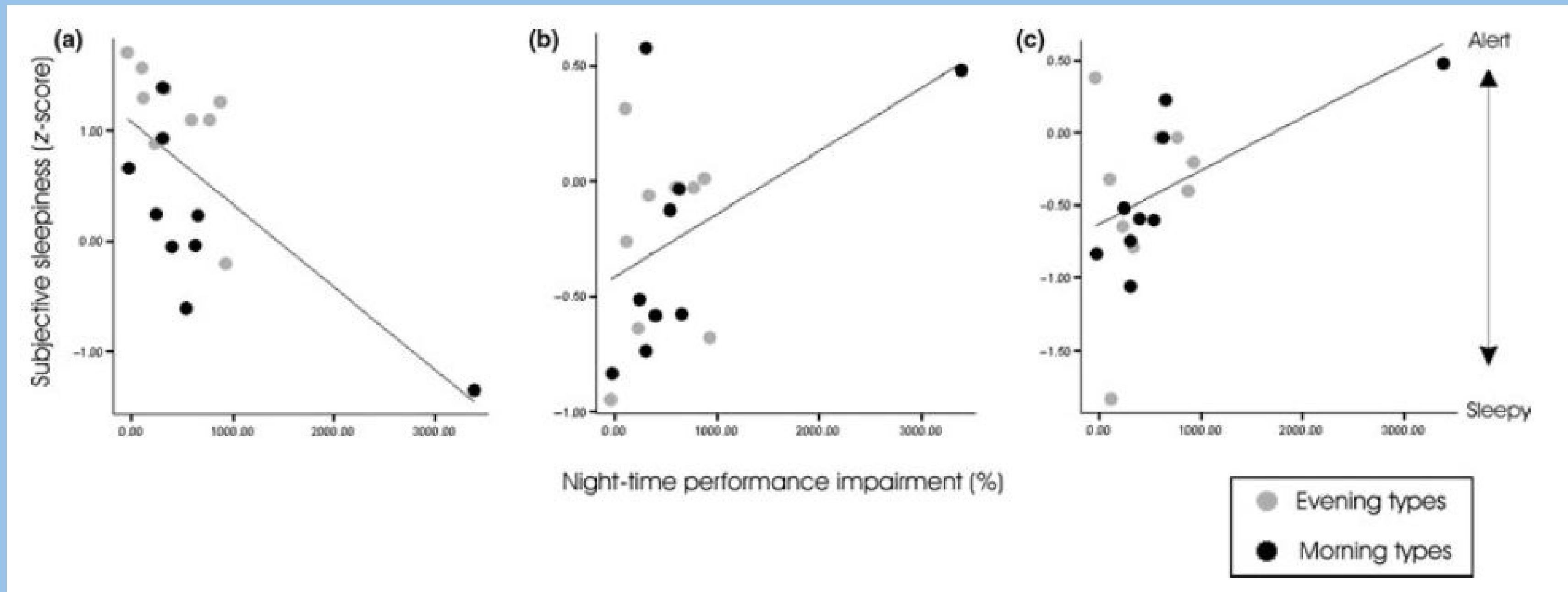


Figure 1. Relationship between nighttime performance impairment (percentage decrease in performance relative to daytime performance) and subjective sleepiness (transformed into z-score) at waking (panel a), at 13:30 hours (panel b) and at 17:30 hours (panel c).

“Although the present study cannot identify the neurobiological basis of differences in vulnerability to sleep loss, it suggests that a very simple question (i.e. Are you fully alert in the minutes following your morning awakening and/or in the early afternoon?) could discriminate at-risk normal subjects for nocturnal operational tasks requiring sustained attention.”

The Effect of Shift Rotation on Employee Cortisol Profile, Sleep Quality, Fatigue, and Attention Level: A Systematic Review

Shu-Fen Niu¹ • Min-Huey Chung² • Chiung-Hua Chen³ • Desley Hegney⁴
Anthony O'Brien⁵ • Kuei-Ru Chou^{6*}

ABSTRACT

Background: Disrupted circadian rhythm, especially working night duty together with irregular sleep patterns, sleep deprivation, and fatigue, creates an occupational health risk associated with diminished vigilance and work performance.

Purpose: This study reviewed the effect of shift rotations on employee cortisol profile, sleep quality, fatigue, and attention level.

TABLE 5.***A Summary of Previous Research on the Effect of Shift Work on Attention***

Author (Year)	Participants (Sample Size <i>n</i>)	Measuring Instruments	Results	Level of Evidence Methodological Quality Score
Lee et al. (2003)	Basic surgical trainee specialists (<i>n</i> = 16)	Addition test, choice reaction time, memory scanning, picture recognition	Neuropsychological tests (memory scanning and addition tests) showed a significant decline in performance during the overnight call period	Comparative with concurrent control III.2 5
Pumell et al. (2002)	Male aircraft maintenance engineers working in a forward-rotating 12-hour shift pattern (<i>n</i> = 24)	1. Reaction time 2. Mackworth clock vigilance task 3. Actigraphy	Taking a nap during the first night shift significantly improved the response speed	Interrupted time series without a parallel control group III.3 6
Rouch et al. (2005)	Various occupational shift workers (<i>n</i> = 3237)	Cognitive test (memory test, digit-symbol substitution subtest of the Wechsler Adult Intelligence Scale, a selective attention test derived from the Sternberg test)	1. Shift workers showed lower cognitive performance than never-exposed workers 2. Memory performance decreased as shift work duration increased	Cohort studies III.2 6
Scott et al. (2006)	Critical care nurses (<i>n</i> = 502)	Logbooks (including the hours worked, the time of day worked, overtime hours, days off, and sleep-wake patterns)	1. Longer work duration increased the risk of errors and near errors and decreased nurses' vigilance 2. After working 12.5 or more consecutive hours, the risk for making an error almost doubled (odds ratio = 1.94)	Case series IV 6
Valdez et al. (2005)	Female undergraduate students (<i>n</i> = 8)	1. Rectal temperature 2. General information questionnaire (health condition, alcohol, tobacco, drug consumption), sleep disorder questionnaire	Circadian variations in attention components are relevant to the decrease in productivity and higher risk of accidents during night shift work	Case series IV 5

CONCLUSÕES



CRONOTIPOS

Embora não haja um consenso sobre a abordagem do conceito, há pontos comuns sobre a importância do estudo do comportamento individual.

ATENÇÃO

Indivíduos respondem de formas distintas ao ambiente, resposta essa que afeta a atenção e o tempo de reação de uma forma geral ao longo do dia

METABOLISMO

Há diferentes picos de funções metabólicas ao longo do dia, o que influencia não apenas na performance física quanto na intelectual, principalmente em situações de abstinência de sono.